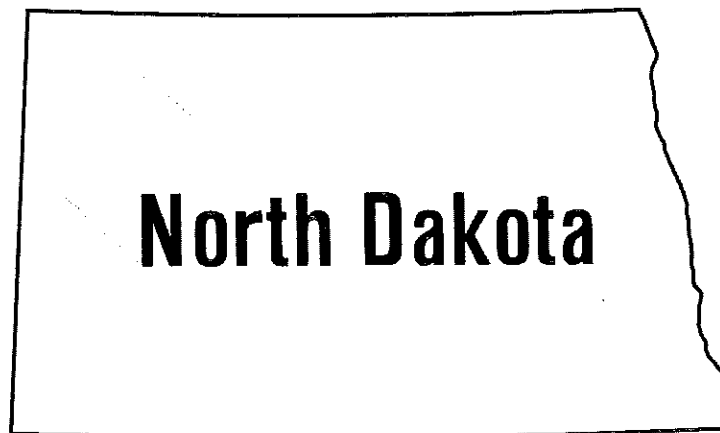


# **North Dakota Resource Management Plan and Environmental Impact Statement**

**DRAFT**



**DECEMBER 1986**

**U.S. Department of the Interior  
Bureau of Land Management  
Dickinson District**



# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

222 North 32nd Street  
P.O. Box 36800  
Billings, Montana 59107

Dear Reader:

This draft Resource Management Plan/Environmental Impact Statement (RMP/EIS) for the Dickinson District, North Dakota, is presented for your review and comment. This document analyzes four alternatives for managing public surface and mineral lands in North Dakota. These alternatives are designed to resolve four management issues identified early in the planning process.

We welcome your comments on the content of this document. We are particularly interested in comments that address one or more of the following: (1) possible errors in the analysis, (2) new information that would have a hearing on the analysis, (3) a possible new alternative not within the range of alternatives presented here, and 4) needs for clarification. Specific comments will be the most useful.

We would appreciate your comments on this RMP/EIS by March 25, 1987. Questions or comments should be directed to Mark Stiles, Project Manager, Dickinson District Office, Bureau of Land Management, P.O. Box 1229, Dickinson, North Dakota 58602 (701-225-9148).

Public meetings have been scheduled to allow individuals the opportunity to comment on the draft RMP/EIS. The meetings will be held at the following locations:

Date	Location	Time
January 27, 1987	BLM Conf. Room, 202 Villard, Dickinson, N.D.	7-9 p.m. MST
January 28, 1987	Williams County Courthouse, Williston, N.D.	7-9 p.m. MST
January 29, 1987	Hazen City Hall, Hazen, N.D.	7-9 p.m. MST
January 27, 1987	Four Season Pavilion, Bowman, N.D.	7-9 p.m. MST

All written and oral comments received during the 90-day comment period will be given equal consideration in the preparation of the final RMP/EIS scheduled for completion in June 1987.

Please keep this copy of the draft document as portions of it may not be reprinted in the final. Copies of the final RMP/EIS will be sent to all those who provide comments on the draft or request a copy.

Thank you for participating in the planning process. Through your participation we can move together toward the common goal of improved public land management in the Dickinson District.

Sincerely,

State Director

DRAFT

NORTH DAKOTA  
RESOURCE MANAGEMENT PLAN/  
ENVIRONMENTAL IMPACT STATEMENT

Dickinson District Office  
Bureau of Land Management

December 1986

A handwritten signature in cursive script, reading "Dean Stepanek".

State Director

# SUMMARY

The North Dakota Resource Management Plan (RMP) addresses future management options for approximately 67,520 acres of public land and 4.8 million acres of federal mineral estate administered by the Bureau of Land Management (BLM) through its Dickinson District Office in Dickinson, North Dakota. The issues discussed below focus attention on the 24 counties in the western half of the state.

## PLANNING ISSUES

The BLM planning process is issue driven. Four issues were identified through public input, resource monitoring, and policy mandate during the scoping process for this RMP. These issues are areas of controversy, requiring resolution in the planning process.

- 1) *Coal Leasing* — Areas of federal coal administered by BLM must be screened for potential for coal development, unacceptable environmental conflicts, and significant surface owner opposition to mining according to the four coal screens (43 CFR 3420.1-4). The application of the screens include consideration of all resources in the unsuitability criteria (43 CFR 3461) as well as other resources not specifically addressed by the criteria.
- 2) *Land Pattern Adjustment* — Small, scattered, and isolated tracts of public land in North Dakota are often difficult or uneconomical to manage. Land pattern adjustments need to be made to improve multiple-use management and to increase resource values for the public.
- 3) *Oil and Gas Leasing* — The uncertain timing, location, and resource impacts of oil and gas development require that potential impacts be analyzed during the planning process and that appropriate measures be prescribed to protect other significant resources. Lease stipulations need to be developed to avoid or mitigate impacts to other resources. Efficient development of oil and gas requires that stipulations are not more restrictive than necessary to accomplish multiple-use objectives.
- 4) *Off-Road Vehicle Use Designations* — BLM has been mandated by executive order (EO 11644) to study and designate public lands as open, limited, or closed to off-road vehicle (ORV) use. Areas where ORV use may cause significant adverse environmental impacts need to be protected by appropriate use designations.

## THE ALTERNATIVES

The formulation and analysis of alternatives is required by the Council of Environmental Quality regulations implementing the National Environmental Policy Act (40 CFR 1500.2(e)) and BLM resource management planning regulations (43 CFR 1610.4-5). The goal of each alternative is the resolution of the issues. Each alternative presents a complete and reasonable guide to future management of public lands and resources. Current management of non-issue resources and programs will continue under all alternatives considered.

Several alternatives were considered during the formulation process but were dropped from detailed study because they were unreasonable or did not adequately address the

planning issues. Four alternatives were developed and analyzed in detail. Below are the major management actions and environmental impacts under each alternative. Further details are found in Tables 2-1 and 2-2.

### Alternative A — No Action

#### Coal Leasing

A total of 391,179 acres are acceptable for further consideration for the leasing or exchange of coal. Leasing of this coal would support new mines and facilities in 13 coal study areas (CSAs). Mining and related facility operation would cause significant long-term decreases in air quality due to increased particulates and sulfur dioxide (SO<sub>2</sub>) in the planning area. Short-term soil erosion, compaction, instability, and loss of productivity would occur on up to 391,179 acres. Long-term erosion would occur on up to 2,793 acres of steep slopes. Mining would cause a short-term decrease in recharge of ground water and could cause short- and long-term losses in the quality and quantity of ground water. A short-term loss of vegetative productivity would occur on all mined acreages. A long-term loss of vegetative diversity would occur on areas of native prairie. The mining of up to 47,373 acres of wooded draws would cause long-term losses in important wildlife habitat and associated populations. Agricultural production would have a short-term loss on up to 274,000 acres of cropland. An estimated 156-782 eligible cultural resource sites could be adversely affected. Construction of mines and facilities would cause long-term increases in local populations and income while creating short- and long-term social problems in areas surrounding the 13 CSAs able to support new mines and facilities.

#### Oil and Gas Leasing

Special stipulations in addition to Montana BLM Standard Stipulations are applied to new oil and gas leases on up to 29,136 acres. New leases on the remaining 431,258 acres would include only standard stipulations. Oil and gas development on up to 459,298 acres would cause long-term increases in odor and potential health problems due to increased amounts of hydrogen sulfide (H<sub>2</sub>S) and SO<sub>2</sub> in the air. Special stipulations would cause long-term increases in oil and gas development costs on up to 29,136 acres. There may be long-term losses in the quality and quantity of ground water on all developed acreages. Special stipulations would protect wildlife habitats and species on 29,136 acres. Significant long-term losses of habitats and species are expected on up to 178,077 acres. Hunting and other recreational opportunities would experience a long-term loss of quality on up to 459,298 acres. Visual quality of the landscape would decrease similarly. Unhindered oil and gas development on 459,298 acres would continue to provide long-term local employment and severance tax income to the state.

#### Land Adjustment

A total of 9,580 acres of public land are identified for disposal or exchange. Preferred acquisition areas are lands adjacent to Big Gumbo and Lost Bridge areas. Disposal would complicate administration of oil and gas leases. Adjustment would improve manageability of public lands, thereby increasing the long-term quality of water resources, wildlife habitat, recreation, and range production. The

and gas leases. Adjustment would improve manageability of public lands, thereby increasing the long-term quality of water resources, wildlife habitat, recreation, and range production. The possible disposal of up to 22,819 acres would be a long-term loss of these lands to the public land base. Adjustment would adversely affect up to 183 cultural resources.

#### **Off-Road Vehicle Use Designations**

ORV use on 22,164 acres in the Big Gumbo area is limited to maintained roads from March 1 to June 1 and open the remainder of the year. All other public lands are designated open to ORV use. Long-term soil erosion and compaction problems would be perpetuated in local areas. Losses of vegetation, wildlife habitat, cultural resources, and disturbance of wildlife would have long-term but minor impacts on 45,356 acres. Long-term ORV recreational opportunities would be maintained in this acreage.

### **Alternative D**

#### **Coal Leasing**

A total of 484,592 acres are acceptable for further consideration for the leasing or exchange of coal. Of these, 110,120 acres have special stipulations. Leasing of this coal would support new mines and facilities in 14 of 24 CSAs. Mining and facility construction would cause significant long-term decreases in air quality due to increased particulates and SO<sub>2</sub> in the planning area. Short-term soil erosion, compaction, instability, and loss of productivity would occur on up to 484,592 acres. Losses would be minimized because no slopes over 15 percent are included. Mining would cause a short-term decrease in recharge of ground water and could cause short- and long-term losses in the quality and quantity of ground water. A short-term loss of vegetative productivity would occur on all mined acreages. A long-term loss of vegetative diversity would occur on areas of native prairie. The mining of up to 6,117 acres of wooded draws would cause long-term losses of wildlife populations. Special stipulations would ensure restoration of up to 110,120 acres of important wildlife habitats. Agricultural production would have a short-term loss on up to 332,000 acres. An estimated 194-969 eligible cultural resource sites could be affected. Construction of mines and facilities would cause long-term increases in local populations and income while creating short- and long-term social problems in up to 14 of 24 CSAs.

#### **Oil and Gas Leasing**

New oil and gas leases on up to 106,620 acres would have special stipulations in addition to Montana BLM Standard Stipulations. Only standard stipulations apply to another 254,277 acres while up to 99,497 acres are closed to new leases. Oil and gas development would cause long-term increases in odor and potential health problems due to increased amounts of H<sub>2</sub>S and SO<sub>2</sub> in the air. Closure of 99,497 acres would cause a long-term loss of potential production on these acreages. Special stipulations would cause long-term increases in oil and gas development costs on up to 106,620 acres. There may be long-term losses in the quality and quantity of ground water on all developed acreages. Special stipulations and closures would protect key wildlife species and habitats. Hunting and other recreational opportunities would experience a long-term loss of quality on up to 360,897 acres. Visual quality of the landscape would decrease similarly. Unhindered oil and

gas development on 196,696 acres would continue to provide long-term local employment and severance tax income to the state.

#### **Land Adjustment**

No public lands are identified for exchange or disposal. Outside applications for exchange or disposal would be reviewed on a case-by-case basis. Lack of an adjustment program may forego the opportunity to consolidate lands for better resource management.

#### **Off-Road Vehicle Use Designations**

ORV use on 22,164 acres in the Big Gumbo area is limited to maintained roads from March 1 to June 1 and limited to roads and trails the remainder of the year. All other public lands are designated open to ORV use. Long-term soil erosion and compaction problems would be perpetuated in local areas. Losses of vegetation, wildlife habitat, cultural resources and disturbance of wildlife would have long-term but minor impacts on 45,356 acres. Long-term ORV recreational opportunities would be maintained in this acreage.

## **CONCLUSION**

The impacts of the four alternatives tend to be similar in quality but substantially different in the numbers of acres affected by given management actions. Alternative C is the preferred alternative because it presents a reasonable balance between commodity production and protection of amenity resources.



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cfs	cubic feet per second
gpm	gallons per minute
hr	hour
km	kilometer
l	liter
kv	kilovolt
lb	pound
m	meter
mg	milligram
mph	miles per hour
mw	megawatt
ppm	parts per million
ug/m <sup>3</sup>	micrograms per cubic meter



# CHAPTER ONE

## INTRODUCTION AND PURPOSE AND NEED FOR ACTION

# CHAPTER ONE

## INTRODUCTION AND PURPOSE AND NEED FOR ACTION

This document consists of a proposed resource management plan (RMP) and a draft environmental impact statement (DEIS). The RMP has been prepared in accordance with the Federal Land Policy and Management Act (FLPMA) and the Bureau of Land Management's (BLM) planning regulations, 43 CFR 1600. The DEIS has been prepared in accordance with the Council on Environmental Quality regulations for implementing the National Environmental Policy Act (NEPA), 40 CFR 1500.

### PURPOSE AND NEED

The North Dakota RMP provides a single comprehensive land use plan for all BLM resource management responsibilities in the state. This master plan will determine the resource condition objectives, allocation of public land resources to various uses, and specific methods of managing those resources. Management decisions presented in this plan will remain in effect until the plan is amended, revised or replaced by a new plan. If significant changes occur in the proposed land uses of the planning area the RMP will be amended or revised.

This RMP will replace all management direction established in the four Management Framework Plans (MFPs) completed for BLM-administered resources in North Dakota during the late 1970s and early 1980s. In addition, the RMP will replace management decisions made following the development of the North Dakota Grazing Environmental Impact Statement (EIS) and the Dickinson District Oil and Gas Environmental Assessment (EA). Previous planning and environmental documents were prepared in a variety of formats and contained varying levels of detail. In addition, portions of the lands and minerals in North Dakota for which the BLM is the managing agency were not considered in previous land use decisions. This RMP will consolidate all major land use decisions under a single format for BLM-administered lands and minerals in the state.

### DESCRIPTION OF THE PLANNING AREA

This document proposes a RMP for all public lands and federal minerals in North Dakota for which the BLM is the sole management agency. A total of 67,520 acres of public lands are located in North Dakota, primarily in Dunn and Bowman Counties. Most of the public lands in these two counties are situated in two major blocks. In Dunn County 15,989 acres make up the Lost Bridge area and in Bowman County about 22,164 acres are situated in the Big Gumbo area. The remaining public lands are situated in small, isolated tracts scattered throughout the state.

There is a total of approximately 5.8 million (MM) acres of federally managed minerals in North Dakota. Federal minerals are located under surface lands managed by various federal agencies, including BLM, the U.S. Forest Ser-

vice (USFS), and the U.S. Corps of Engineers (Table 1-1). Federal minerals are also located under state or privately owned surface. This RMP proposes management strategies for federal minerals located under BLM-administered surface and under private lands not situated within the administrative boundaries of other federal land management agencies. Land use planning for federal minerals located within the administrative boundaries of other federal agencies is conducted by the appropriate surface managing agency.

This plan and DEIS will consider approximately 4.8 MM acres of federal minerals. Most of this acreage is located in the western one-half of the state. The bulk of this total mineral acreage, approximately 4.2 MM acres, is federal coal reservation only. An additional 460,394 acres are federal oil and gas reservation only; and the remaining federal minerals are made up of all minerals, coal and oil and gas only, or other combinations.

Public lands in North Dakota constitute about three percent of all federally administered surface in the state. Other major federal land systems in the state include the Little Missouri, and Shyenenne National Grasslands, Theodore Roosevelt National Park, Corps of Engineers lands surrounding Lakes Sakakawea and Oahe, and National Wildlife Refuges and Waterfowl Production Areas.

There are five Indian Reservations in North Dakota: Standing Rock, Fort Totten, Turtle Mountain, Sisseton, and Fort Berthold. Of these, only Fort Berthold and Standing Rock Reservations lie in close proximity to major BLM land and mineral responsibilities.

TABLE 1-1  
FEDERAL OWNERSHIP OF SURFACE, COAL, AND  
OIL AND GAS ESTATES WITHIN NORTH DAKOTA<sup>1</sup>

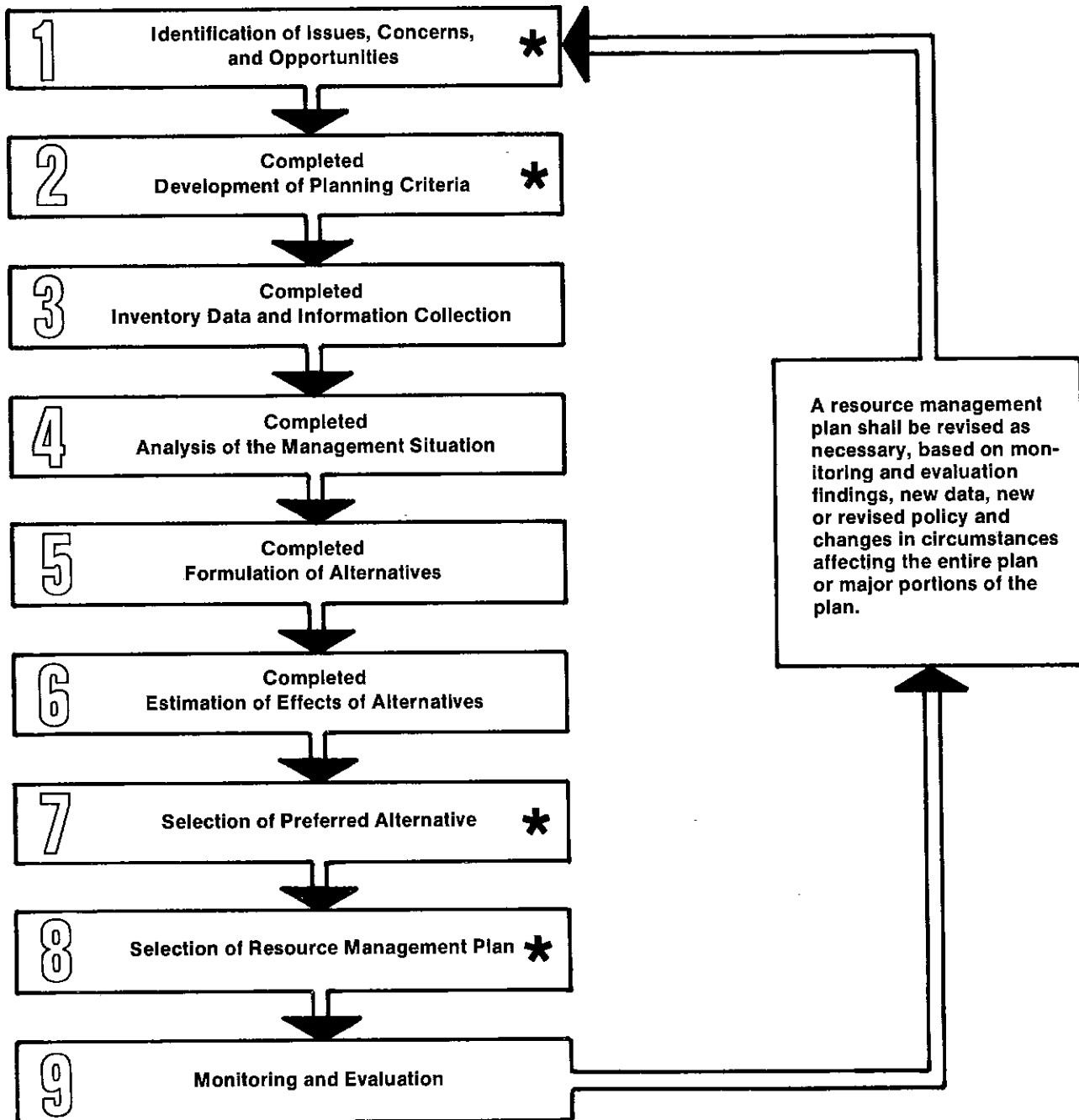
Federal Agency	Coal Acres <sup>3</sup>	Surface Acres <sup>2</sup>	Oil and Gas Acres <sup>3</sup>
Bureau of Land Management	4,200,000	67,520	460,394
U.S. Forest Service		1,105,545	963,285
Bureau of Reclamation		10,089	1,388
U.S. Fish and Wildlife Service		417,138	8,371
Army Corps of Engineers		559,077	9,807
U.S. Air Force		12,347	0
Bureau of Indian Affairs		762	0
National Park Service		71,057	10,444
TOTALS		2,243,535	1,453,689

<sup>1</sup>Agencies with minor ownership not included.

<sup>2</sup>Public Land Statistics 1984. BLM figure modified to reflect recent land pattern adjustment.

<sup>3</sup>BLM Dickinson District Inventory Record. Includes all oil and gas rights administered by BLM and USFS and on Public Domain Lands of other agencies.

**FIGURE 1-1**  
**STEPS IN THE**  
**RESOURCE MANAGEMENT**  
**PLANNING PROCESS**



\* Steps Requiring Public Participation

Exchanges are to be preferred over sales as a method of land disposal. All exchange or acquisition proposals will be evaluated according to the criteria listed in the State Director's Guidance for Land Pattern Review and Land Adjustment. Local review criteria should be developed to establish a mechanism for site specific review of potential disposals and acquisitions.

## **Oil and Gas Leasing**

Lease stipulations will be developed for all areas of federal oil and gas where BLM has primary responsibility for surface and/or subsurface protection under 40 CFR 1500 and 43 CFR 3100.

All areas known to contain natural resource values of regional or national importance should be identified in the plan and appropriate lease stipulations should be developed.

Wetlands and riparian areas should be protected through the use of lease stipulations.

Necessary ORV designations should be incorporated into oil and gas leasing stipulations.

## **Off-Road Vehicle Use Designations**

ORV use designations should be made on all BLM-administered surface lands.

ORV use in areas containing high wildlife values should be restricted to minimize disruption of wildlife habitats or population needs.

ORV use in areas having excessively erosive soils or moderately steep or steeper slopes should be restricted.

ORV use within riparian areas should be restricted as appropriate.

Non-restrictive "open" ORV use designations should be made on all BLM-administered surface lands which would not be significantly adversely impacted by ORV use.

## **Nonissue Resources and Programs**

All nonissue resources and programs should be addressed by the RMP.

Objectives, goals, and general management guidance should be prescribed for nonissue resource programs.





## CHAPTER TWO ALTERNATIVES

# CHAPTER TWO

## ALTERNATIVES

### ALTERNATIVE FORMULATION

The formulation and analysis of alternatives are required by the Council on Environmental Quality regulations implementing the NEPA (40 CFR 1500.2(e)) and BLM resource management planning regulations (43 CFR 1610.4-5). Each alternative represents a complete and reasonable plan to guide future management of public lands and resources. One alternative must represent no action; meaning the continuation of present management and levels of use. Together, the alternatives present a range of reasonable management opportunities which address and, in part, resolve the resource management issues.

The goal of each alternative developed is the resolution of the issues. A variety of specific management actions addressing the individual issues was identified. These management prescriptions were then grouped according to general management themes. Current management of nonissue resources and programs will continue under all alternatives considered. The specific actions geared towards the resolution of the issues, along with the current management prescriptions for nonissue resources and programs, comprise the alternatives.

Four alternative management plans were developed and analyzed in detail. These alternatives are based on the management themes of: (1) no action, or continuation of present management; (2) balance of multiple use; (3) maximization of commodity resource production; and (4) the general protection of amenity resources.

Descriptions of the management themes, alternative-specific management actions, and management guidance common to all alternatives are presented in this chapter. A comparative summary of the projected impacts under each alternative is also provided.

### ALTERNATIVES ELIMINATED FROM DETAILED STUDY

Several alternatives or portions of alternatives were considered during the formulation process but were dropped from detailed study. A brief description of the alternatives not considered in detail is provided below.

#### No Coal Areas Acceptable for Further Consideration for Coal Leasing

This alternative would have eliminated all of the 24 CSAs from further consideration for the leasing of federal coal. This alternative was eliminated from detailed study for four basic reasons:

- 1) Potential regional economic growth would be limited by prohibiting or obstructing the mining of coal in western North Dakota.
- 2) In some portions of the study area there are few or no significant conflicts occurring between the mining of coal and natural resources or social and economic structures.

3) National objectives of providing for reasonable and efficient energy production and achieving energy independence would not be met.

4) Federal laws and regulations would be violated by unnecessarily excluding areas of federal coal from potential leasing and development.

### Disposal of All Public Lands in North Dakota

This alternative would classify all public lands for disposal. Disposals would, presumably, be accomplished through sales, Recreation and Public Purposes (R & PP) Act patents, and withdrawals to other federal agencies. This alternative was eliminated from detailed study for the following reasons:

- 1) Little management efficiency would be realized. Due to present policy, federal mineral estate would be retained. BLM mineral management responsibilities would remain for approximately 4.8 MM acres, including minerals within the jurisdiction of other Surface Management Agencies requiring a continued BLM presence in the state.
- 2) Past public comment has identified the lack of publicly-owned lands available for recreational use as a resource management concern. Disposal of all public lands in the state would be contrary to public wishes.
- 3) Legal and regulatory statutes require the protection of such resources as critical habitats of endangered species, wetlands and riparian areas, significant cultural resources, etc. Disposal of all public lands in the state would be possible only if the continued protection of these resources could be ensured through restrictive patent covenants or by transferring lands to other resource management agencies.

### Intensive Management of All Public Lands

This alternative would involve increased management activity and expenditures on the scattered tracts of public lands in North Dakota. Management actions would include increased trespass abatement, fencing of some tracts, signing, wildlife improvements, etc. This alternative was eliminated from further study for the following reasons:

- 1) Frequent visits to individual tracts would be necessary to implement and monitor management activities. The scattered land pattern results in excessive transportation and travel costs. In general, the small size and scattered pattern of tracts would also preclude any economies of scale for construction projects or other management activities.
- 2) The small size (average of about 44 acres) typical of the scattered tracts limits the potential for management. Intensive management of the small tracts may have little or no beneficial effect on resources of adjacent tracts. Investments on small tracts would produce little overall benefit to surrounding areas.

reviewed for compliance with the AAQSS. If air quality standards are being exceeded, mitigating measures such as air pollution control devices will be required and NDSOH will be notified.

## Hydrology

Water resource management on public lands will be in accordance with the objectives of multiple-use and will be coordinated with all other uses and objectives. BLM policy (BLM Manual 7200.04B9) is to protect, maintain, restore, and/or enhance the quality of water on all public lands so quality of the water will be maintained equal to, or above, legal standards (Clean Water Act of 1977, Standards of Water Quality for State of North Dakota). Specifically, water quality monitoring of land-use activities shall be performed to evaluate, maintain, protect or enhance water quality on, or passing through, public lands (FLPMA).

Executive Orders (11988 and 11990) and other directives mandate the Bureau to: (1) reduce the risk of flood loss, (2) minimize the risk on human safety, health and welfare, (3) preserve the natural and beneficial values served by floodplains, and (4) minimize the loss or degradation of wetlands when acquiring, managing, or disposing of public lands and facilities.

The Clean Water Act of 1977 requires the BLM to participate with state and other federal agencies in water quality planning, Section 208, to prevent degradation of water quality, and to implement Best Management Practices (BMPs) to the extent practical under the National Nonpoint Source Policy. Because sediment is by far the largest single nonpoint source pollutant derived from public lands in North Dakota, the BLM's approach to BMPs for sediment reduction will meet multiple-use objectives while still providing an acceptable level of water quality protection.

## Minerals

### Application of Coal Screens

The federal coal planning process (Appendix A) involves the use of four screens during the development of land use plans: (1) the identification of areas with coal development potential, (2) the application of twenty criteria to identify areas unsuitable for surface mining, (3) multiple-use trade-off decisions, and (4) consultation with surface owners to determine opposition to surface mining of federal coal. Three of these screens, coal development potential, unsuitability criteria, and surface owner consultation are not subject to alternative methods of application. The application of these three screens is the same for all alternatives. However, alternatives have been developed for the multiple-use tradeoff screen. The specific factors involved in the application of all four coal screens are presented in Appendices B through E.

The identification of areas with coal development potential was based on information obtained from U.S. Geological Survey (USGS) exploration drilling and information provided by industry. Identified areas are based only on available coal resource information and may not represent the absolute boundaries of the coal resource.

The twenty unsuitability criteria, and corresponding exemptions and exceptions, were applied to all areas with identified coal development potential. In Alternative A, nine of the criteria were found to apply. Eight of the criteria applied in Alternatives B, C, and D. The application of the unsuitability criteria is presented in Appendix C.

Consultation with qualified surface owners to identify their preferences towards the surface mining of coal was conducted for all areas having potential for coal development except for those portions of the CSAs that were excluded from consideration early in the process due to obvious multiple use conflicts. Areas of significant surface owner opposition were excluded from further consideration. The methods used to consult with qualified surface owners and the results of consultation are presented in Appendix E.

Specific coal lease areas will be analyzed in detail during activity level planning or in response to applications for lease. Documentation of NEPA compliance will be completed for all tracts prior to lease offering. Cumulative impacts of coal leasing and subsequent mining will also be addressed at this stage. At the time of site-specific analysis resources such as air quality and cultural resources, which could not be analyzed in detail during land use planning, will be fully assessed.

### Other Coal Management Actions

Other coal management actions such as review and approval of exploration plans (43 CFR 3482 and 3484) and the processing of emergency leases (43 CFR 3425.1-4) will be conducted in response to applications in accordance with the appropriate coal management regulations.

### Oil and Gas

The oil and gas leasing program will be administered by the BLM Montana State Office (MSO). All areas to be leased that fall within identified resource concern areas (Map K-1) will be forwarded to the Dickinson District Office for the determination of appropriate stipulations (Appendix K). Lease applications for locations outside of resource concern areas would be reviewed and processed entirely by the state office.

APDs and Sundry Notices received will be processed according to the terms and stipulations of the lease. Additional stipulations required to protect sensitive resources or human health may be added as conditions of approval of the APD. All APDs and Sundry Notices will be analyzed in accordance with NEPA and corresponding regulations of the Council on Environmental Quality. Appendix P provides a description of APD processing procedures.

Priority for inspection of wells is determined by levels of production, past lease compliance records and health and safety considerations. Priority wells are reviewed for violations of health and safety requirements, environmental protection, and possible royalty loss due to operator negligence in construction of production facilities or reporting of produced/sold hydrocarbons. Operations violating lease stipulations and the conditions of approval stated in the APD are issued either Incidence of Noncompliance statements or written orders to correct noncompliance. Fines and recommendations for back payments of federal royalties are imposed at this time.

The potential for drainage of federal hydrocarbons will be assessed. If a case of drainage is suspected, the lessee of the offending tract will be notified. Following a complete review of reservoir information, a determination of "no drainage" or a demand to protect the federal minerals is made. Minerals could be protected through the development of a protective well, the payment of compensatory royalties, the development of Communitization Agreements, or the recommendation for, and subsequent commitment of, the offending lands to a Participating Area or Unit Agreement. If the affected minerals are not leased the BLM MSO



implemented on all manageable riparian areas by the year 2001. An extensive inventory of riparian habitat was completed in 1986. A list of tracts known or suspected to have riparian habitat is available in the Dickinson District Office.

These tracts will be prioritized and then evaluated for ecological condition, potential, and suitability for management by 1995. Those lands that are not manageable by BLM due to small size or distant locations may be transferred to another federal agency, managed by a state agency under a cooperative management agreement, exchange for similar, more manageable, habitat, or sold. The dispose/retain classifications in Appendix Q may be changed as a result of the evaluations.

For those tracts that are manageable our objectives will be to maintain areas that are currently in satisfactory condition and rehabilitate areas that are in unsatisfactory condition. Areas with exceptional resource values or potential will have the highest priority for protection or enhancement.

Where land use or activity plans are currently in place, such as AMPs in the Big Gumbo area, plans will be adjusted as necessary to ensure that adequate quantifiable riparian objectives are present. All new plans will include such objectives where applicable.

All rights-of-way, leases, and permits will have the following stipulation under the preferred alternative where applicable.

No disturbance of riparian vegetation will be allowed except for essential road and utility crossings. Construction and rehabilitation in riparian areas will conform to the provisions of BLM Manual Handbook H-2801-1, Right-of-Way Plans of Development and Grants.

Cooperative management agreements with resource management agencies or special interest groups concerned with habitat management will be pursued when high importance habitats which cannot be intensively managed or fully protected by the BLM are encountered. Cooperative agreements will establish the management objectives and roles and responsibilities of the BLM and cooperating agency or group.

Monitoring of riparian and other wildlife habitats on public lands will continue to assess management effectiveness, need for the development of activity plans, and general trend of habitat condition.

All future management actions will be subject to the requirements of the Endangered Species Act (1973, as amended) on a case-by-case basis.

## **Lands and Realty**

Unauthorized uses of public land will be resolved either through termination, cooperative agreement authorized by the Sikes Act, authorization by lease or permit, exchange (including exchange with the State) or sale.

New cases of unauthorized use will be resolved immediately. Permits may be issued to provide short-term authorization, unless the situation warrants immediate cessation of the use and restoration of the land. Highest priority will be given to abatement of the following unauthorized uses: (1) new unauthorized activities or uses where prompt action can minimize damage to public resources and associated costs, (2) cases where delay may

be detrimental to authorized users, (3) cases involving special areas, sensitive ecosystems, and resources of national significance, (4) cases involving malicious or criminal activities, and (5) unauthorized landfills and dumpsites where there is a potential for hazardous waste dumping.

Trespass agricultural use of public lands will be authorized in the following situations: (1) until disposition or reclamation of the land has occurred, (2) where the acreage is small, causes low impact and is incidental to similar uses on adjacent land, and (3) where agricultural use will benefit public values. In light of these criteria public land with agricultural potential (small, scattered parcels) will be considered for agricultural use on a case-by-case basis.

Patents for Color-of-Title or other entry will be issued when appropriate. Other title resolution cases, e.g., disclaimers of interest and right-of-way abandonments, will be processed.

Right-of-way applications will be considered on a case-by-case basis. Areas containing resources or uses that would be impacted and difficult or impossible to mitigate will be avoided. Areas to be avoided include:

- 1) Areas having potential for recreational development,
- 2) Environmentally sensitive areas such as crucial wildlife habitats, wetlands, slump areas, and extensive wooded areas,
- 3) Areas containing significant archaeological, historical, or paleontological values,
- 4) Areas with specific visual objectives — adjacent to established parks, adjacent to the Little Missouri Scenic River, and
- 5) Areas with high potential for coal mining.

Future facilities will be located within or adjacent to existing rights-of-way when possible and when environmental conditions permit. The designation of utility corridors across public land is not practical because of the relatively small areas of control or influence designation would have. Official corridors will be established if changes in conditions such as public land pattern or right-of-way uses warrant.

The North Dakota Public Service Commission (NDPSC) has siting authority for energy conversion facilities and major transmission lines in the state. The District will present concerns addressing potential impacts of siting on important public land and mineral resources at all opportunities afforded by the NDPSC. Concerns will also be presented at all opportunities to the North Dakota Transportation Division during their review of proposed railroad abandonments.

Other legitimate uses of public land may be authorized on a case-by-case basis by permits, leases, and easements.

Patents may contain easements which assure access for use of public land, by the public. An easement may be used to preserve important resources such as archaeological or historical sites or habitat of threatened or endangered animal species on public and adjacent private land if it is determined to be in the public interest.

Private exchange and exchange pooling are preferred to sales as methods of disposal. The mineral estate will be exchanged with the surface estate if the land does not contain known minerals. Sales of public land may take place under the criteria presented in Section 203 of FLPMA

SHPO, determines the federal undertaking will not impact eligible cultural resources. (2) No adverse effect — the agency in consultation with the SHPO determines there will be an effect but the effect will not be adverse. The agency submits to the Advisory Council on Historic Preservation (ACHP) a report which describes the nature of the undertaking and a justification for a determination of no adverse effect. The ACHP may concur, object with conditions (project may proceed if conditions are met) or object (in this case a consultation process is initiated among ACHP, the agency and SHPO). (3) Adverse effect — when the agency determines the effect on cultural resources will be adverse, the agency, SHPO, and the ACHP consider ways to avoid or mitigate the impact of the federal undertaking on cultural resources. Measures considered during consultation may include preservation of the cultural resource, restoration (restoring, repairing) of the cultural resource, documentation (photographs, drawings, and histories of buildings and structures), reducing the magnitude of the undertaking, redesigning the project, and data recovery (refers to archaeological sites where data may be recovered through controlled excavation). Once the consulting parties agree on the measures to avoid or mitigate the impact to eligible cultural resources by the federal undertaking, and the conditions or stipulations have been met, the project may proceed.

Mitigation or avoidance of adverse effects to eligible cultural resources may not be possible in all cases. Further, if the federal undertaking is of great public benefit, in relation to the significance of the cultural resources, damage to or destruction of cultural resources may be considered an acceptable loss.

If a historic property is discovered during the course of a project that was not previously identified, the contractor must contact the BLM. If the cultural resource is determined to be eligible through consultation with the SHPO, the agency is directed, by the Archaeological and Historic Preservation Act of 1974, to notify the Secretary of Interior, in writing, describing the project and the nature of the cultural resource. The agency may request the Secretary to undertake or fund the recovery, protection, and preservation of the data, or it may request the developer to hire qualified cultural resource specialists to undertake such activities. The Secretary determines if the significance of the resource, the effect on the resource by the project, and any proposed mitigation warrants ACHP consideration. In most cases, however, once the cultural resource has been determined eligible, the agency usually will proceed with Section 106 review.

All persons conducting cultural resource fieldwork on public lands in the District are required to obtain a Cultural Resource Use Permit from the MSO in Billings. These permits are granted under the authority of the Archaeological Resources Protection Act of 1979 (ARPA), FLPMA, Antiquities Act of 1906, and 43 CFR Parts 3, 4, 7, and 2920.

District Managers are responsible for authorizing and monitoring specific field work proposed and conducted under any cultural resources use permit. This is accomplished by the permittee submitting a Fieldwork Authorization request to the District Manager. Once approved the permittee may proceed with the fieldwork.

Activity plans may be development for significant cultural resources located on public lands. Consideration of cultural resources will also be included in other activity plans such as AMPs or CRMPs.

## Paleontological Resources

The Antiquities Act of 1906 extends protection to paleontological resources of significant scientific interest. This Act authorizes the Bureau (in this case, the MSO of the BLM) to issue permits to qualified paleontologists to conduct work on public lands. Currently, the authority is limited to vertebrate fossils, but if significant invertebrate or plant fossils are located on public land the authority could be extended to cover those resources.

Paleontological resources will be considered on a case-by-case basis prior to a federal action. If paleontological resources are discovered during construction the contractor must report these findings to the BLM. A subsequent evaluation and management decision will be made concerning the disposition of the resources. Management plans may then be formulated which protect resources of scientific interest.

## Fire Management

Wildfires on public lands will be controlled. Cooperative agreements with county governments for the control of fires on public lands will be established. Permittees, lessees, and contractors will be required to control fires on public land included in their operations.

Prescribed burn plans and assessments will be prepared as needed for vegetation manipulation and made available to county governments, permittees, and adjacent landowners for review.

## Areas of Critical Environmental Concern

There have been no ACECs identified on public lands in the District. If areas of public land containing critical resource values are identified, each area will be reviewed in coordination with appropriate state or federal agencies to determine levels of protection necessary. ACEC designation will be made when critical resource values cannot be protected through other management actions.

## ALTERNATIVES CONSIDERED IN DETAIL

Four alternatives were considered in detail. These alternatives were based on the general themes of no action or continuation of present management (Alternative A), maximization of commodity resource production (Alternative B), a balance of multiple uses (Alternative C), and protection of amenity resources (Alternative D). Each of the four alternatives, in combination with Management Guidance Common to All Alternatives, represents a comprehensive plan for managing public lands and minerals in North Dakota. Table 2-1 presents a summary of the major resource allocations and management actions under each alternative.

## ALTERNATIVE A—NO ACTION OR CONTINUATION OF PRESENT MANAGEMENT

This alternative would continue present management in accordance with the four existing MFPs, decisions based on the North Dakota Grazing EIS, North Dakota Oil and Gas EA, other programmatic environmental documents, and present BLM policy and management direction.

### Coal Leasing

A total of 607,131 acres located in 18 CSAs were identified as having coal development potential. The 18 CSAs contain an estimated 12,168 MM tons of minable federal coal. Application of the unsuitability criteria eliminated 151,568 acres from further study. An additional 45,272 acres were dropped from further consideration under the application of the multiple use screen. A total of 1,559 landowners were consulted regarding their preference towards surface mining of federal coal. The surface owner consultation screen dropped 19,112 acres from further consideration due to significant surface owner opposition to mining (Appendices B through G).

The application of the four coal screens resulted in a total of 215,952 acres, containing an estimated 4512 MM tons of minable federal coal, being excluded from further consideration. A total of 391,179 acres of federal coal (7656 MM tons) would be acceptable for further consideration during activity planning, response to application, or for exchange. After the application of all screens, 13 CSAs contain sufficient federal coal tonnage to support a typical new mine and facility.

Multiple-use tradeoffs excluded from further consideration include concentrations of slopes exceeding 30 percent, buffer zones for lakes, wildlife refuge watersheds, experiment stations, municipal watersheds, and buried valley aquifers, portions of the eligible Knife River Flint Quarry National Register District and all of A.C. Townley Homestead, and major oil and gas fields (Appendix D).

### Land Pattern Adjustment

A total of 9,580 acres located in the Southwest, McKenzie-Williams and West-Central North Dakota MFP areas were identified for disposal. Land pattern review criteria are presented in Appendix N. The theme of this alternative is to continue the present practice of retaining manageable areas with high resource values, broad multiple-use values, or potential for further consolidation through acquisition of adjacent lands.

The primary method of disposal would be through exchange. Target areas for exchange would be adjacent to the Big Gumbo and Lost Bridge areas and contiguous to high resource value retention tracts. Lands identified for disposal would also be available for transfer to other federal agencies, R & PP Act patents, and sales.

### Oil and Gas Leasing

Special lease review areas or stipulations would be established for approximately 29,136 acres of federal oil and gas. A review area and stipulations would be used, when necessary to protect nesting Golden Eagles on 28,040 acres. Spe-

cial lease stipulations would be used in addition to Montana BLM Standard Stipulations. No Surface Occupancy would be applied to 1,096 acres to protect floodplains, native prairie, and wetlands. The remaining 431,258 acres of federal oil and gas located under BLM or private surface would fall under Montana BLM standard lease stipulations.

Much of the federal oil and gas considered in this plan is presently under lease. Should these leases expire or otherwise terminate, parcels falling within the identified special review areas will be analyzed in greater detail to determine the need for the special stipulations presented in Appendix N. No new stipulations will be placed on existing leases.

The following tabulation shows the general categories of stipulations that would be added to leases and acreages of federal oil and gas affected.

Stipulation Category	Low or No Oil/Gas Potential	Moderate Oil/Gas Potential	High Oil/Gas Potential	Unknown Oil/Gas Potential	Total
	(acres)	(acres)	(acres)	(acres)	(acres)
Open	— <sup>1</sup>	— <sup>1</sup>	— <sup>1</sup>	— <sup>1</sup>	431,258
Open with no surface occupancy or seasonal restrictions	0		28,040	1,096	29,136
Closed	0	0	0	0	0

<sup>1</sup> Acreage not available by category.

### Off-Road Vehicle Use Designations

Previous MFP decisions did not designate public lands as open or closed. Under existing management, however, all public land is open to ORV use. Emergency closures may be made when necessary.

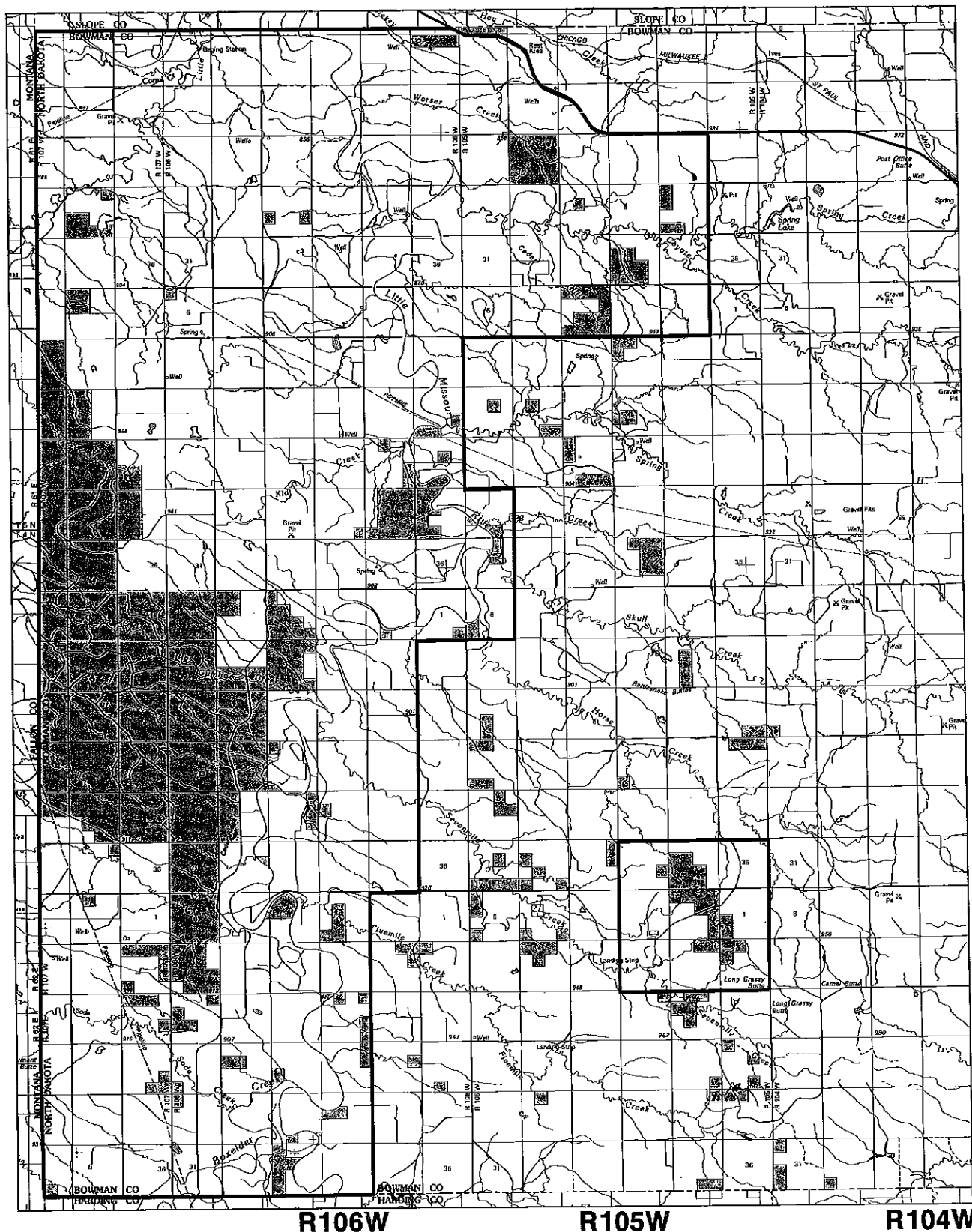
## ALTERNATIVE B

This alternative is based on the themes of maximizing commodity resource production, consolidating land pattern to improve management efficiency and maximizing opportunities for ORV travel and recreation.

### Coal Leasing

A total of 1,009,648 acres located in 24 CSAs were identified as having coal development potential. The 24 CSAs contain an estimated 17,750 MM tons of minable federal coal. Application of the unsuitability criteria eliminated 193,382 acres from further study. An additional 128,833 acres were dropped from further consideration under the application of the multiple-use screen. A total of 3,403 landowners were consulted regarding their preference towards surface mining of federal coal. The surface owner consultation screen dropped 90,417 acres from further consideration due to significant surface owner opposition to mining (Appendices B through G).

The application of the four coal screens resulted in 412,632 acres, containing an estimated 6,778 MM tons of minable federal coal, being excluded from further consideration. Under this alternative 597,016 acres of federal coal (10,972 MM tons) would be acceptable for further consideration during activity planning and/or response to application. Of this, 151,577 acres would be acceptable with special



## Big Gumbo and Vicinity



Public lands



Consolidation area boundary — Alternative C only

**Map 2-1.**

Unmanageable tracts containing high resource values would be available for transfer to other federal agencies that due to proximity, budget, or management policy, would be better able to manage the tracts. When exchange or transfer is not feasible, the tracts would be available for sale, and R & PP patent.

Private groups able to manage and preserve special resource values could be identified as designated bidders in circumstances where unmanageable tracts contain high resource values and private groups have expressed interest.

Protective covenants in patents would be used when necessary to protect high value resources located on unmanageable tracts offered for disposal. However, protective covenants would be the least desirable method of preserving resource values. Protective covenants would be used when they are consistent with county zoning or state law. Compliance/enforcement would thereby be provided by local government officials.

## Oil and Gas Leasing

Special lease review areas or stipulations would be established for approximately 206,117 acres of federal oil and gas. These stipulations and review areas would be used, when necessary, to protect wetlands, riparian areas, sage grouse leks, elk and bighorn sheep range, raptors, and the Fort Union Trading Post National Historic Site. Special lease stipulations would be used in addition to the Montana BLM standard lease stipulations. The remaining 254,277 acres of federal oil and gas located under BLM or private surface would fall under Montana BLM standard lease stipulations.

Much of the federal oil and gas considered in this plan is presently under lease. Should these leases expire or otherwise terminate, parcels falling within the identified special review areas will be analyzed in greater detail to determine the need for the special stipulations presented in Appendix K. No new stipulations will be placed on existing leases.

The following tabulation shows the general categories of stipulations that would be added to leases and acreages of federal oil and gas affected.

Stipulation Category	Low or No Oil/Gas Potential	Moderate Oil/Gas Potential	High Oil/Gas Potential	Unknown Oil/Gas Potential	Total
	(acres)	(acres)	(acres)	(acres)	(acres)
Open with no special stipulations	— <sup>1</sup>	— <sup>1</sup>	— <sup>1</sup>	1 <sup>1</sup>	254,277
Open with no surface occupancy or seasonal restrictions	0	103,326	37,020	65,771	206,117
Closed to leasing	0	0	0	0	0

<sup>1</sup>Acreage not available by category.

## Off-Road Vehicle Use Designations

A total of 22,164 acres of public land is designated as a seasonally restricted area for off-road travel, and 45,356 acres open to ORV use. ORV use within the Big Gumbo area would be restricted to maintained roads during the period of March 1 through June 1. Travel necessary for

emergency, scientific, and maintenance purposes would be excluded from restrictions.

Off-road travel restrictions were developed to protect fragile vegetation and soils during spring thaw when the risk of impacts is greatest. ORV travel stipulations would be incorporated in all future oil and gas leases. Emergency closures may be implemented when needed.

## ALTERNATIVE D

This alternative is based on the general theme of protection of amenity values. The protection of values such as cultural resources, wildlife habitats, and recreational opportunities is favored over potentially conflicting uses or actions such as the development of mineral resources or the disposal of public lands. The management actions allow for levels of resource use which do not result in significant long-term adverse impacts.

## Coal Leasing

A total of 1,009,648 acres located in 24 CSAs was identified as having coal development potential. The 24 CSAs contain an estimated 17,750 MM tons of minable federal coal. Application of the unsuitability criteria eliminated 193,382 acres from further study. An additional 257,779 acres were excluded from further consideration under the application of the multiple-use screen. A total of 3,403 landowners were consulted regarding their preference towards surface mining of federal coal. The surface owner consultation screen excluded 73,895 acres from further consideration due to significant surface owner opposition to mining (Appendices B through G).

The application of the four coal screens resulted in 525,056 acres, containing an estimated 8,517 MM tons of recoverable federal coal, being excluded from further consideration. Under this alternative, 484,592 acres of federal coal (9,233 MM tons) would be acceptable for further consideration during activity planning, response to application, or for exchange. Of this, 110,120 acres would be acceptable with special stipulations (Appendix F). Fourteen CSAs containing blocks of federal coal with sufficient tonnage to support a typical new mine and facility remain in the area found acceptable for further consideration.

Areas excluded from consideration due to multiple use conflicts include: concentrations of slopes exceeding 15 percent, regionally or nationally significant cultural resources, major oil and gas fields, major utility and transportation facilities, intensive public use or development areas, municipal watersheds, buried-valley aquifers, and areas exceeding the established threshold of regionally significant wildlife habitats (Appendix D).

## Land Pattern Adjustment

No lands were identified for disposal. Land pattern review criteria are presented in Appendix N. All public lands in North Dakota would be retained except for disposals in response to outside applications. Based on the number of cases processed in the past ten years, few applications would be received for R & PPs, withdrawals, and Color-of-Title patents. Each application or request would be reviewed through an appropriate environmental analysis and land report.

## **Oil and Gas Leasing**

Alternative C identifies special stipulations necessary to protect resource values identified in the planning criteria while continuing to allow development of most federal oil and gas in the state. The special stipulations identified generally represent the minimum restriction necessary to protect sensitive resources. Identification of special stipulations prior to lease offering and, especially, APD approval, ensures that both operators and BLM recognize the presence of potential conflicts. Identifying possible restrictions at this stage also facilitates long-range planning by industry.

## **Off-Road Vehicle Use Designations**

Alternative C fulfills the need for ORV travel restrictions as mandated by EO 11644. ORV travel would be essentially unrestricted on public lands. Seasonal restrictions in the Big Gumbo area are prescribed to protect fragile soils and vegetation during wet periods. These seasonal restrictions address the resource concerns in the planning criteria while having minimal impact on ORV users. There is presently little evidence of either significant demand for ORV opportunities or adverse impacts resulting from ORV use. However, this alternative would effectively accommodate any foreseeable increase in demand while avoiding unnecessary resource protection.

**TABLE 2-2 (continued)**  
**SUMMARY OF ENVIRONMENTAL IMPACTS**

Resource	Alternative A	Alternative B	Alternative C	Alternative D
Hydrology	Coal mining on up to 391,179 acres would cause short-term erosion and disrupt infiltration with resulting decrease in ground water recharge.	Same coal-related impacts as Alternative A occurring on up to 597,016 acres.	Same coal-related impacts as Alternative A occurring on up to 571,388 acres except buried-valley aquifers would be protected on 12,318 acres.	Same coal-related impacts as Alternative A on up to 484,592 acres.
	Springs, seeps and shallow wells may become dry or have lower levels for the long term. Shallow ground water quality and quantity may drop in the short- and long-term.			
	Land pattern adjustment of up to 9,580 acres would improve manageability allowing reductions in water yields, improvement in water quality and a decrease in erosion and sedimentation in the long term.	Same impacts related to land pattern adjustment as Alternative A occurring on up to 38,848 acres.	Same impacts related to land pattern adjustment as Alternative A occurring on up to 34,663 acres.	No land pattern adjustment under this alternative.
	Oil and gas activity would cause short-term increases in erosion and sedimentation on individual well locations. There may also be long-term decreases in water quantity and degradation of water quality.	Other impacts same as Alternative A.	Limitations on ORV use would reduce water degradation on 22,164 acres.  Other impacts same as Alternative A.	Limitations of ORV use on 22,164 acres would minimize impacts to water resources.  Water resources would not be affected by development of future oil and gas leases on the 99,497 acres closed to leasing.
Vegetation	Coal mining on up to 391,179 acres would cause a short-term loss in vegetative productivity and a long-term loss in species diversity.	Same coal-related impacts as Alternative A occurring on up to 597,016 acres.	Same coal-related impacts as Alternative A occurring on up to 571,388 acres.	Same coal-related impacts as Alternative A occurring on up to 484,592 acres.
	Continuation of current range management would increase total vegetative production by about 6.5 percent in the long term.	Other impacts same as Alternative A.		
	ORV use would cause minor vegetative loss in the short and sometimes long term.		Limitations on ORV use would minimize short- and long-term vegetative loss on 22,164 acres.	
	Oil and gas activity would cause both short- and long-term loss of vegetative productivity on individual well locations.		Other impacts same as Alternative A.	Vegetation would not be affected by development of future oil and gas leases on the 99,497 acres closed to leasing. Other impacts same as Alternative C.

**TABLE 2-2 (continued)**  
**SUMMARY OF ENVIRONMENTAL IMPACTS**

Resource	Alternative A	Alternative B	Alternative C	Alternative D
Recreation and Visual Resources	Coal mining on up to 391,179 acres would cause the short-term loss of recreational resources.	Same coal-related impacts as Alternative A occurring on up to 597,016 acres.	Same coal-related impacts as Alternative A occurring on up to 571,388 acres.	Same coal-related impacts as Alternative A occurring on up to 484,592 acres.
	There would be a long-term increase in recreational demands in areas being mined due to influx of population.	Other impacts same as Alternative A.		Other impacts same as Alternative C.
	There would be long-term visual intrusions caused by mining operations.			
	Pooling of public lands would increase recreational opportunities in the long term.			
	Recreational opportunities would be enhanced in the long term by unrestricted ORV designation.		Limitations on ORV use would only slightly limit recreation activities on 22,164 acres.	
	Oil and gas development would limit hunting and decrease recreational quality while increasing pressure on adjacent areas in the long term.		Other impacts same as Alternative A.	
	Road development due to oil and gas activity would enhance access in the long term.			
Cultural Resources	Oil and gas facilities would be a long-term visual intrusion.			
	Coal mining on up to 391,179 acres could adversely affect an estimated 156-782 sites eligible for listing on the NRHP.	Coal mining on up to 597,016 acres could adversely affect an estimated 239-1194 sites eligible for listing on the NRHP.	Coal mining on up to 571,388 acres could adversely affect an estimated 229-1143 sites eligible for listing on the NRHP.	Coal mining on up to 484,592 acres could adversely affect an estimated 194-969 sites eligible for listing on the NRHP.
	Land pattern adjustment on up to 9,580 acres would affect an estimated 77 cultural resources.	Land pattern adjustment on up to 38,848 acres would affect an estimated 311 cultural resources.	Land pattern adjustment on up to 34,663 acres would affect an estimated 277 cultural resources.	No land pattern adjustment.
	Unrestricted ORV use on public lands would cause minor vehicle damage and unauthorized collections to cultural resources in the long term.	Other impacts same as Alternative A.	Seasonal limitations of ORV use on 22,164 acres would reduce impacts to cultural resources.	Limitations of ORV use to roads and trails on 22,164 acres would minimize impacts to cultural resources.
	Impacts to cultural resources resulting from oil and gas development would be slight.		Other impacts same as Alternative A.	Cultural resources would not be affected by development of future oil and gas leases on the 99,497 acres closed to leasing.



**TABLE 2-2 (continued)**  
**SUMMARY OF ENVIRONMENTAL IMPACTS**

Resource	Alternative A	Alternative B	Alternative C	Alternative D
	Oil and gas exploration and development would continue to provide local employment. Severance taxes would benefit state government and mitigation of energy development impacts.			



## CHAPTER THREE

# AFFECTED ENVIRONMENT

# CHAPTER THREE

## AFFECTED ENVIRONMENT

### CLIMATE AND AIR QUALITY

#### Climate

The climate of North Dakota is semiarid to continental. Air masses causing changes in the weather originate in the Arctic, Gulf of Mexico, and the Northern Pacific. There are no topographical barriers to modify the flow of cold, dry air masses from polar regions and warm, moist air masses from tropical regions. There are often large and rapid changes in weather conditions over the state.

Temperatures throughout North Dakota fluctuate widely on an annual, seasonal, and daily basis. Annual mean temperatures range from 37°F in the northeast to about 43°F in the southwest. Temperature extremes can range from below -40°F to over 110°F. Average July temperature is about 69°F and average January temperature is 10°F.

Average annual precipitation varies from 13 inches in the northwest to about 20 inches in the east (Figure 3-1) with up to 70 percent of precipitation falling as rain between May and July. Precipitation is mainly derived from air masses originating from the Gulf of Mexico. Winters are long and cold with snow accumulations from November or December through March.

Windy conditions are common due to the greatly fluctuating temperatures and lack of physical barriers. Prevailing winds are from the north-northwest at an average speed of 12 miles per hour (mph). Winds of 25-30 mph will often last for 6 hours and can last as long as 15 hours. Winds in excess of 30 mph have lasted more than 6 hours.

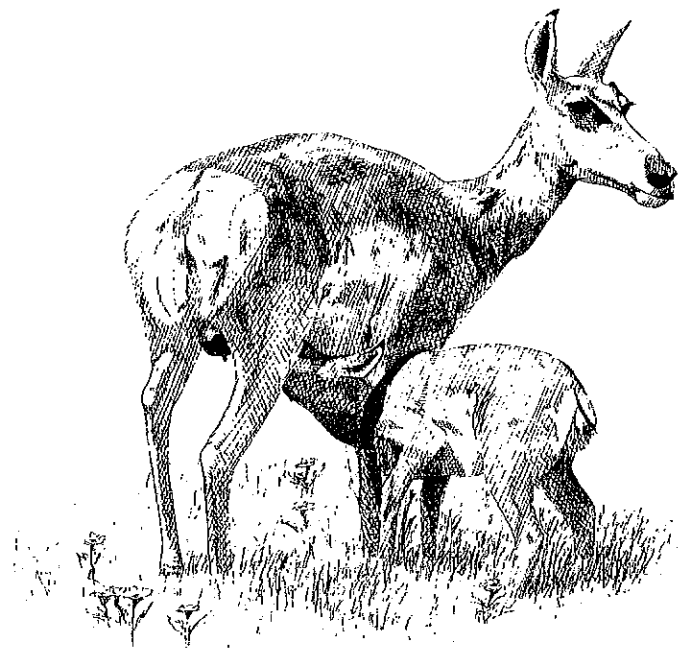
Severe weather may occur almost any time during the year. Blizzards are a common occurrence during winter and early spring. High winds and hail frequently occur in connection with summer thunderstorms.

#### Air Quality

Data indicate the general air quality of North Dakota is good with localized areas in the Williston Basin showing incidences of noncompliance with State and National AAQS. Noncompliance is presumably caused by the burning of fossil fuels and flaring of gas during energy production or development are the primary sources of contamination in western North Dakota.

The NDSHD is responsible for monitoring air quality. Their network of monitoring stations provides air quality data to: (1) determine background levels of pollutants such as total suspended particulates (TSP), SO<sub>2</sub>, and H<sub>2</sub>S, (2) determine highest concentration of pollutants in area, and (3) determine impacts of these pollutants from nearby significant sources. NDSHD has monitoring sites near several of the major coal areas which include stations in the vicinity of Mandaree, Theodore Roosevelt National Park — North Unit, Lone Butte, and Dunn Center.

The three major pollutants measured by the NDSHD are pertinent due to increased development of oil, gas, and coal. H<sub>2</sub>S is emitted in major quantities from the oil and gas fields. SO<sub>2</sub> results from the flaring (burning) of the gas containing H<sub>2</sub>S and from the burning of fossil fuels in



facilities such as coal-fired power plants. These gases create health and safety hazards, offensive odors, and contribute to air quality problems such as acid rain. TSP results from fugitive dust of coal mining and burning of fossil fuels. Haul roads and construction activities are also major sources of fugitive dust. Increased levels of TSP may affect visual quality and can aggravate respiratory ailments.

Table 3-1 shows the concentrations of the three pollutants from several of the monitoring sites for 1984. The Lone Butte site is centrally located in an oil and gas development field of high H<sub>2</sub>S concentration (approximately 20 percent by volume). The monitoring site is virtually surrounded by point sources emitting both H<sub>2</sub>S gas and SO<sub>2</sub> from the flaring of the H<sub>2</sub>S gas. The Theodore Roosevelt National Park-North Unit and Dunn Center monitoring sites are in fairly remote areas relatively free of direct point source contamination. Comparison between the monitoring site results and the AAQS (Table 3-2) indicates violations of those standards occur as a localized problem associated with specific oil and gas development sources. Modeling of the immediate sources would further refine the localized air quality impacts caused by near sources. However, further regional studies are necessary to analyze and isolate the areas of development that may be causing violation of the standards.

Air quality standards applicable to pollutant sources in the oil and gas fields are those resulting from the Federal Clean Air Act and the North Dakota Pollution Control Act. Selected North Dakota AAQS and the National AAQS are listed in Table 3-2. The National AAQS are expressed as both primary and secondary standards. Primary standards are those required, with an adequate margin of safety, to protect public health. Secondary standards are those necessary to protect the public welfare from any known or anticipated adverse effects associated with air pollutants.

**TABLE 3-1**  
**1984 POLLUTION DATA SUMMARY**

Pollutant	Location	No. of Observations	1-Hour Maximum Concentration (ug/m³)		3-Hour Maximum Concentration (ug/m³)		24-Hour Maximum Concentration (ug/m³)		AMC* (ug/m³)
			1st Observ.	2nd Observ.	1st Observ.	2nd Observ.	1st Observ.	2nd Observ.	
Sulfur Dioxide SO2	Dunn Center	8,231	76	73	57	55	24	19	4
	TRNP-N¹	8,263	105	94	92	92	78	29	4
	Lone Butte	8,049	1,038	1,003	786	723	311	259	31
Hydrogen Sulfide (H2S)	TRNP-N¹	16,169	581	570	—	—	—	—	4
	Long Butte	16,532	3,542	2,705	—	—	—	—	60
			24-Hour Maximum Concentration (ug/m³)			Annual Geometric Mean (ug/m³)			
			1st Observ.	2nd Observ.	3rd Observ.				
Total Suspended Particulate (TSP)	Mandaree	53		102		78		25	31
	Dunn Center	56		117		69		19	26
	TRNP-N	51		239		89		23	36

<sup>1</sup>Theodore Roosevelt National Park-North Unit.

\*Arithmetic Mean Concentration

**TABLE 3-2**  
**NORTH DAKOTA AND NATIONAL AIR QUALITY STANDARDS FOR SELECTED POLLUTANTS**

Pollutant	North Dakota Standard	Federal Primary Standard	Federal Secondary Standard
Total Suspended Particulates	60 ug/m <sup>3</sup> annual geo. mean. 150 ug/m <sup>3</sup> 24-hr average <sup>1</sup>	75 ug/m <sup>3</sup> annual geometric mean 260 ug/m <sup>3</sup> 24-hr average <sup>1</sup>	60 ug/m <sup>3</sup> annual geometric mean 150 ug/m <sup>3</sup> 24-hr average <sup>1</sup>
Sulfur Dioxide	60 ug/m <sup>3</sup> annual average 260 ug/m <sup>3</sup> 24-hr average 715 ug/m <sup>3</sup> ppm 1-hr average <sup>1</sup>	80 ug/m <sup>3</sup> annual average 365 ug/m <sup>3</sup> 24-hr average <sup>1</sup>	1300 ug/m <sup>3</sup> 3 phr average <sup>1</sup>
Nitrogen Dioxide	100 ug/m <sup>3</sup> annual average 200 ug/m <sup>3</sup> 1-hr average	100 ug/m <sup>3</sup> annual average	100 ug/m <sup>3</sup> annual average
Hydrogen Sulfide	45 ug/m <sup>3</sup> 1/2-hr average <sup>2</sup> 75 ug/m <sup>3</sup> 1/2-hr average <sup>2</sup>	None None	None None

<sup>1</sup>Not to be exceeded more than once per year.

<sup>2</sup>Not to be exceeded more than twice in any five days.

Standards apply only to facilities accessible by surface owners, industry employees, or general public.

The AAQS are also established to protect public health and welfare. The state standards must be as stringent as the federal standards but may be more strict if the state so decides.

Under the 1977 Federal Clean Air Act Amendments, states were required to classify areas as: (1) attainment areas where air quality is better than National AAQS, (2) non-attainment areas where air quality concentrations exceed National AAQS, and (3) unclassified areas where there was insufficient data to classify the area. There are no "nonattainment areas" established in North Dakota.

The one-hour standard for SO<sub>2</sub> was exceeded nine times at the Lone Butte site. The three-hour federal standard was not exceeded. The 24-hour standard was exceeded once at the Lone Butte site and the annual standard was not exceeded.

No state or federal standards were exceeded at either the Dunn Center or Theodore Roosevelt National Park-North Unit Monitoring Stations. Comparison with other time average standards shows that no concentration values exceed these percentages.

Average hourly concentrations and mean monthly concentrations of SO<sub>2</sub> are typically greatest during the winter-time when the atmospheric mixing height is reduced and both atmospheric stability and fumigation frequency (plume contacts the ground) are increased. At each of the three monitoring stations the highest recorded levels of SO<sub>2</sub> are associated with infrequently occurring calm or light wind conditions.

Several major H<sub>2</sub>S gas producing oil fields are situated to the east and to the south of Theodore Roosevelt National Park and undoubtedly account for much of the measured SO<sub>2</sub>. H<sub>2</sub>S emission appears to be a greater problem in geographical extent and number of violations of standards than SO<sub>2</sub> emission. While apparently not a region-wide problem, H<sub>2</sub>S concentrations exceeded standards at both the Theodore Roosevelt National Park-North Unit site and the Lone Butte site. The state half-hour standard was exceeded 2,834 times at the Lone Butte site and 34 times at the Theodore National Park-North Unit site. The highest recorded value was at the Lone Butte site at a concentration of 3,542 ug/m<sup>3</sup>.

The H<sub>2</sub>S standard maximum half-hour concentration was exceeded 3,575 times at the Lone Butte site and 85 times at the Theodore Roosevelt National Park-North Unit site. This demonstrates the influence of a major sour gas-producing field overlapping the Dunn-McKenzie county line. Presently, the State Department of Health is meeting with the oil and gas operators in the Lone Butte Field to establish action plans which would implement measures to bring the field into compliance with the H<sub>2</sub>S AAQSS. NDS DH is the lead agency for any enforcement actions should voluntary compliance measures fail.

#### **Total Suspended Particulates**

Only one sample exceeded the state TSP 24-hour standard. However, since one exceedance is permitted per year there were no violations of the TSP standard. Local sampling near coal mines may show exceedances of the AAQS and possible consumption of increment for Prevention of Significant Deterioration (PSD).

The PSD program allows a specific increase of an air pollutant above an existing baseline air quality. The incremen-

**TABLE 3-5**  
**COAL STUDY AREA ACREAGES**

CSA	Coal Acreages		
	Nonfederal	Federal	Total
Antelope	111,880	32,360	144,240
Arnegard	10,560	25,020	35,580
Beulah-Zap	108,680	57,200	165,880
Bowman-Gascoyne	63,296	21,320	84,616
Center-Stanton	121,680	27,480	149,160
Dickinson	307,040	108,628	415,668
Divide	49,640	3,760	53,400
Dunn Center	139,500	88,560	228,060
Elgin-New Leipzig	31,400	14,400	45,800
Elkhorn	5,040	25,380	30,420
Fortuna	10,920	19,400	30,320
Garrison	70,500	12,660	83,160
Golden Valley	50,148	21,960	72,108
Hanks	57,680	47,100	104,780
Keene	40,720	122,700	163,420
Mott	93,320	42,200	135,520
New England	172,400	95,800	268,200
Niobe	10,200	160	10,360
Sand Creek	117,530	57,240	174,770
Tobacco Garden	13,360	64,060	77,420
Underwood	27,760	2,600	30,360
Velva	112,400	20,280	132,680
Washburn	33,800	1,360	35,160
Williston	87,160	98,020	185,180
Totals	1,846,614	1,009,648	2,856,262

Coal beds of economic interest in North Dakota are in the Tongue River and Sentinel Butte Members of the Fort Union Formation (Paleocene in age, about 60 MM years old). Three other units (the Ludlow Member in the lower Fort Union, Golden Valley Formation above the Fort Union, and Hell Creek Formation below) contain coal which is too thin, impure, and discontinuous to be of economic value.

The Tongue River Member is about 350 to 900 feet thick. It is made up of alternating layers of sandstone, siltstone, claystone, limestone, and lignite coal (Rehbein 1977; Royse 1967, 1971). The Sentinel Butte Member is likewise made of sandstone, siltstone, claystone, limestone, and coal. It contains slightly more sandstone than the Tongue River Member (Jacobs 1976).

Overburden, the sediments above the coals of interest for mining, consists of the sandstones, siltstones, and claystones of the Tongue River and Sentinel Butte Members and the Golden Valley and White River Formations, and the silts and gravels of the Coleharbor, Walsh, and Oahe Formations. These last three are alluvial and glacial deposits capping the upland surfaces and lining river valleys.

The coal beds of the Fort Union range in thickness from thin films to a reported 37 feet. Generally, only beds at least five feet thick are considered to be of interest. North Dakota mines usually remove from 4 to 20 feet of coal from one to four beds.

North Dakota coal is ranked as lignite. Its heating value ranges from 5,000 to 7,500 British thermal units per pound (Btu/lb). North Dakota coal typically has moisture content ranging from 33.0 to 44.0 percent, ash 4.0 to 19.0 percent, and sulfur content 0.2 to 2.4 percent.

The coal resources of North Dakota have been estimated at various times. Brant (1953) estimated 351 billion tons. Ave-

ritt (1971) identified 15 billion tons of this to be strippable in beds greater than five feet thick and under less than 100 feet of overburden. The constant acquisition of new data allows continual refinement of these estimates. The resources identified in the current study areas total 44.2 billion tons for North Dakota (Appendix B).

Ten mines in North Dakota produced a total of 25.4 MM tons of coal in the year ending June 30, 1985. One mine transports coal by rail out of state. A second mine sends part of its production out of state. Another processes weathered lignite (leonardite) for fertilizer, cosmetics, and oil and gas drilling mud additives. The remaining mines support either mine-mouth electric power and synfuel facilities, or power plants in the vicinity.

Eight of these mines hold 20 federal coal leases. Three of these 20 leases are mined out, leaving 17 active, minable leases (Appendix O). There are 235 MM tons of recoverable coal left in these leases. There are about 17,000 acres of federal coal under lease.

## Oil and Gas

Oil and gas exploration and development in North Dakota has been concentrated in the western third of the state in the area generally referred to as the Williston Basin. The Williston Basin covers approximately 200,000 square miles of western North Dakota, northwestern South Dakota, eastern Montana, southern Saskatchewan, and extreme southwestern Manitoba.

The majority of oil and gas production in North Dakota can be found in Williams, Billings, and McKenzie Counties. The following are also oil and gas producing counties: Divide, Burke, Renville, Bottineau, Hettinger, Ward, McLean, Mountrail, Bowman, Dunn, Golden Valley, Stark, Slope, Mercer, and McHenry.

In 1984 a Memorandum of Understanding (MOU) between BLM and USFS covering oil and gas operations within the Little Missouri National Grasslands was put into operation. This facilitated surface management involving 771 producing federal wells falling within the grasslands boundary. Of North Dakota's 412 producing oil and gas fields 93 also fall within this boundary. USFS personnel act as BLM's agent at on-site inspections within the grasslands while BLM retains all subsurface authority, approval, inspection, and enforcement responsibilities.

As of October 1985, a total of 10,695 wells have been drilled in North Dakota. These wells vary in depths from less than 2000 feet in gas wells in the Eagle Member of the Pierre formation in Bowman County to greater than 13,000 feet in oil wells in the Red River formation in Bowman, Billings, and McKenzie Counties.

Exploration and development of oil and gas is generally characterized in three categories: (1) development drilling, (2) wildcat drilling, and (3) extension drilling. The number of wells that have been drilled through the end of calendar year 1984 include:

	Producers	Dry
Development	3901	1240
Wildcat	466	2731
Extension	845	823

Source: NDIC 1985

**Class VI** — These soils have moderate potential for reclamation, depending upon the chemical and physical properties of the soil. They are generally unsuited for cultivation and are best suited for pasture or range, woodland or wildlife food and cover.

**Class VII** — These soils have low potential for reclamation because of the chemical and physical properties of the soils and the rugged topography on which they are found. They are limited largely to grazing, woodland, or wildlife.

**Class VIII** — These soils and landforms are generally unsuited for reclamation, because of the chemical and physical properties of the soils and the rugged topography on which they are found. These are best suited for watershed protection, recreation, wildlife or aesthetic purposes.

The reclamation potential of the CSAs as it pertains to restoring agricultural and rangeland productivity is generally high (Table 3-6). About 48 percent of the surface over federal coal in the CSAs is dominated by soils in LCCs II and III. About 24 percent has hilly and steep slopes greater than 15 percent and falls into LCCs VII and VIII. The largest areas of slopes greater than 15 percent are in the Williston and Tobacco Garden CSAs.

**TABLE 3-6**  
**RECLAMATION POTENTIAL<sup>1</sup>**

Probable Reclamation Success	Mapping Units <sup>2</sup>	Slope Class Percent	Acres and Percent of Surface Over Federal Coal Represented	Dominant Land Capability Classes (LCCs)
High	Chama-Cabba	6-9	481,960 (48%)	I, II, III
	Cresbard	0-3		
	Flaxton	3-6		
	Golva-Chama	3-6		
	Morton	3-6		
	Morton-Cabba	6-9		
	Morton-Regent	3-6		
	Vebar	3-9		
	Vebar-Williams	3-9		
	Williams	0-6		
	Williams-Cresbard	0-3		
	Williams-Zahl	6-9		
Moderate	Cabba-Morton	9-15	282,701 (28%)	IV, V, VI
	Cabba-Morton-Rhoades	9-15		
	Morton-Rhoades	0-9		
	Regent-Rhoades	3-6		
	Rhoades	3-6		
	Wabek-Lehr	6-9		
	Zahl-Cabba	9-15		
	Zahl-Williams	9-15		
Low	Cabba	15-30	244,987 (24%)	VII, VIII
	Cabba-Badland	30+		
	Cabba-Flasher	15-30		
	Flasher-Vebar	15-30		
	Zahl	15-30		
	Zahl-Cabba	15-30		
	Zahl-Flasher	15-30		

<sup>1</sup>Reclamation potential is determined by the soil profile to 60 inches.

<sup>2</sup>Mapping from Soil Survey Report (Patterson et al. 1968).

## Surface Lands

### Big Gumbo Area

Much of the area is on the Cedar Creek anticline, which is characterized by a dissected landscape dominated by low, rounded hills. The southern edge of the area has numerous flat-bottomed gullies and irregularly shaped "blowouts" with sandy hummocks formed by wind.

The soils of the area are dominated by the Dilts and Lisam series. Both these soils have formed in soft, crumbly Pierre shale. They are clayey, well drained, shallow soils with low inherent fertility. The Dilts soil is acidic whereas Lisam is neutral to moderately alkaline. Soils on the southern edge of the area have formed in the Fox Hill formation. These are mostly sandy soils such as Ekalaka, Zeona and Ladner. They are moderately deep, well drained, alkali, and have rather low available water capacity, and low to medium inherent fertility.

### Lost Bridge Area

About two-thirds of the management area is badlands or steep terrain (greater than 30 percent); five to ten percent has nearly level slopes (0-3 percent), primarily along the Little Missouri River. The remaining area varies from gently sloping to hilly and steep (3-30 percent slopes).

Soils in the area along the Little Missouri River are primarily covered by the Banks-Trembles-Havrelon soil mapping unit. These three soil series are on nearly level to gently sloping (0-6 percent) sites. They are well and somewhat excessively drained, deep, coarse, moderately coarse, and medium-textured soils formed in recent alluvium.

Public lands on the uplands are primarily covered by the Cabba-Badland-Cherry-Arikara soil mapping unit. These soils and badlands are found on slopes ranging from nearly level to very steep (1-120 percent). They are well and excessively drained, shallow to deep, medium and moderately fine-textured soils formed in weathered soft bedrock, local alluvium, and colluvium.

### Scattered Tracts

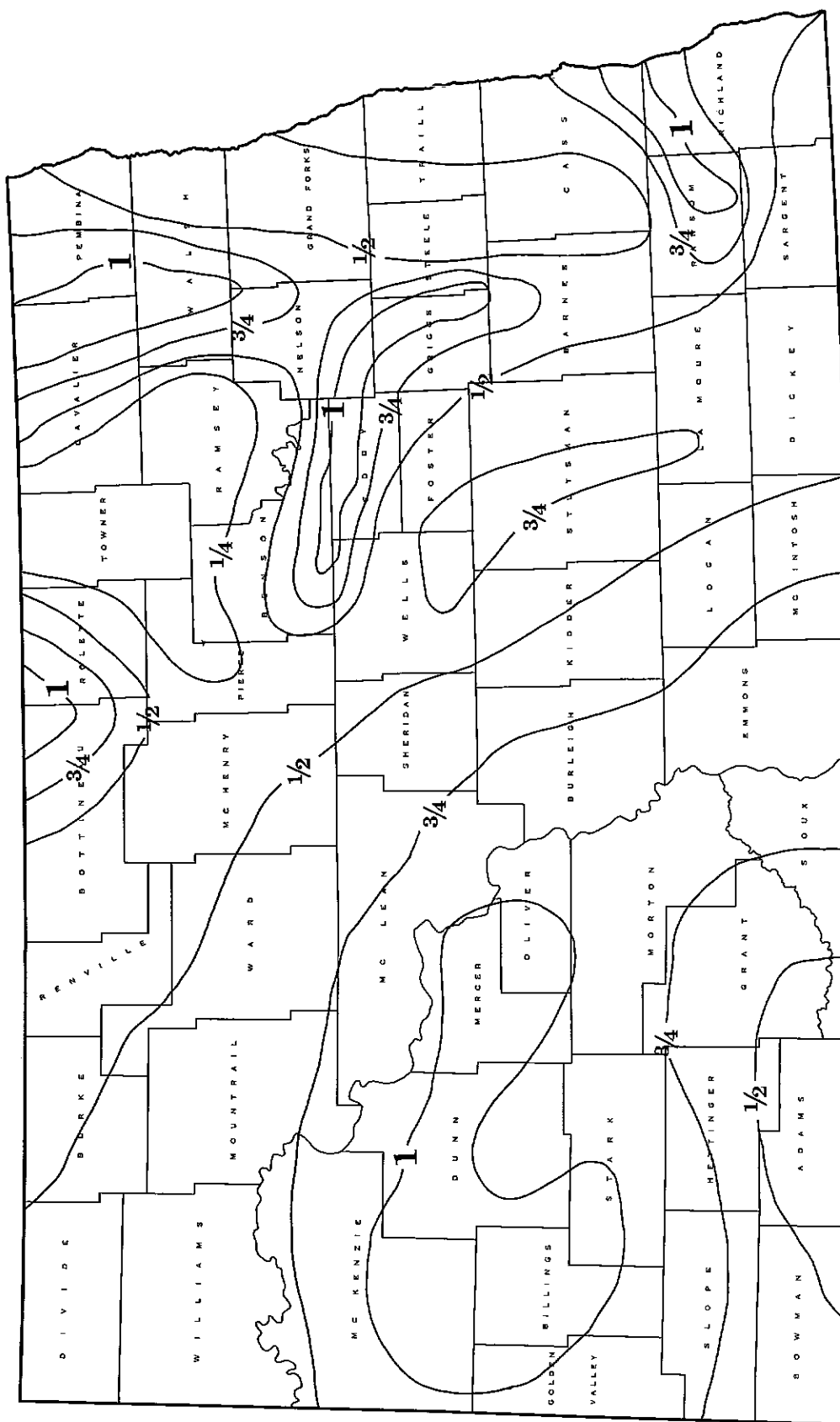
In the unglaciated southwestern portion of the state, most of the tracts are covered by sodic claypan soil (Rhoades) on nearly level slopes, shallow soils on steep slopes (Cabba, Flasher), and badland areas with numerous outcrops of shale and sandstone.

Soils on scattered tracts in the semi-glaciated region near Lake Sakakawea are often located in rough "breaks." They are dominated by shallow soils (Cabba, Flasher) formed in shale and sandstone and deep soils with poor development formed in remnants of glacial till (Zahl). There are also areas of exposed shale and sandstone due to the highly erosive nature of these steep areas.

Scattered tracts north and east of the Missouri River in the glaciated prairie and prairie pothole region are covered by soils formed in glacial till (Max, Williams, Zahl), alluvial material around ponds, potholes, and marshes (Lallie, Parnell, Tonka, Ojata), and glacial lake and outwash sediments (Hecla, Maddock, Serden). Those tracts with soils formed in glacial till are often hilly (15-30 percent slopes) and covered by stones.

## Other Mineral Estate

Federal minerals are located mainly in the western one-third of the state. Topography consists of nearly level to



Average annual runoff in North Dakota in inches (Winter et al. 1984).

FIGURE 3-2



The Lake Agassiz Plain in northeastern North Dakota consists of lake deposits of ancient Lake Agassiz. This area is very flat. Streams are sluggish, meandering, and have well protected banks. Sediment loads and dissolved solids loads in streams are low, but nutrient levels are high.

## Ground Water

Ground water is more evenly distributed throughout the state than surface water. Most wells finished in aquifers yield small quantities of water that generally are not large enough for commercial uses but adequate for domestic and livestock uses. Most rural and municipal water users in North Dakota depend on ground water for their domestic water source.

There are seven primary water-yielding zones (aquifers) located beneath the surface (Table 3-7). The areal extent of these is shown in Figure 3-4.

**TABLE 3-7**  
**PROPERTIES FOR THE MAJOR NORTH DAKOTA**  
**GROUND WATER ZONES**

System/ ERA	Formation	Water Quality	Depth (feet)	Yield (gpm)
Quaternary	Alluvium & Buried Valley	Saline or Fresh	0-500	0-500
Tertiary	Fort Union	Saline or Fresh	0-1100	1-100
Cretaceous	Fox Hills-Hell Creek	Saline or Fresh	Few-2500	1-150
	Pierre	Saline	—	0-100
	Dakota	Saline	100-5600	0-500
Paleozoic		Saline	150-13,500	—
Precambrium		Fresh	300	Few

Source: Mineral and Water Resources of North Dakota. 1973. North Dakota Geological Survey. Bulletin 63. 252 pp.

Aquifers of the Fort Union Formation consist of silt and clay, interbedded with layers of sandstone and lignite. These sandstones and lignite beds are the water-yielding units. Movement in this system is slow and yields are around 10 gallons per minute (gpm). Dissolved solids concentrations are usually around 1000-2500 mg/l.

Generally, wells tapping aquifers in the Fox Hills-Hell Creek zone will usually yield fresh water wells yielding less than 30 gpm; but locally yields may be as high as 150 gpm. Total dissolved solid concentrations are usually 1000-3000 mg/l and locally can be as high as 10,000 mg/l.

The Pierre aquifer is not a major aquifer but may be the best source of water for farm and municipal use where a local fracture zone is unusually thick or large. Quality of water is extremely variable. Total dissolved solids will range from 700 to 12,500 mg/l.

The Dakota aquifer underlies most of North Dakota except for a narrow strip along the Red River. The aquifer is used for oil field purposes and salt water disposal in the western part of the state. In the eastern part of the state, it is a freshwater source for numerous farms and some municipalities. Quality of water is highly variable. Total dissolved solids concentration within the aquifer range from 3000 mg/l in eastern North Dakota to over 10,000 mg/l in western North Dakota.

The Paleozoic aquifer occurs throughout the state except where it is missing near the Precambrian aquifer. In the eastern part of the state the Paleozoic aquifer is used for domestic purposes. Water from the aquifer is used only for oil production purposes in the western part of the state. Total dissolved solids are 14,000 to 54,000 mg/l in the east and 58,000 to 330,000 mg/l in the west.

Precambrian rocks underlie all of North Dakota but are only considered to be an aquifer along the Red River where water may be obtained in fractures. Yields will not be more than a few gpm. Total dissolved solids will generally vary from 900-3000 mg/l.

Alluvium and buried-valley aquifers are some of the most important sources of high quality shallow ground water in the state (Figure 3-5). They are scattered throughout most of the glaciated portion of North Dakota and consist of sand and gravel deposits associated with perennial stream channels, buried preglacial channels, and buried glacial meltwater channels. Buried-valley aquifers generally yield 100-500 gpm, have relatively good quality water with total dissolved solids ranging from 400-2500 mg/l, and in most areas are considered suitable to marginal for irrigation purposes.

## Surface Lands

The Big Gumbo area is located within the unglaciated Northern Great Plains physiographic province of the Missouri River Plateau. Water movement through the soil zone is primarily controlled by soil characteristics. Most of the area is made up of soils derived from shale parent material having slow infiltration rates of 0.0-0.05 inches/hour. Rain on snow, rain on saturated soils, or intense summer thunderstorms are the precipitation events that will typically produce runoff.

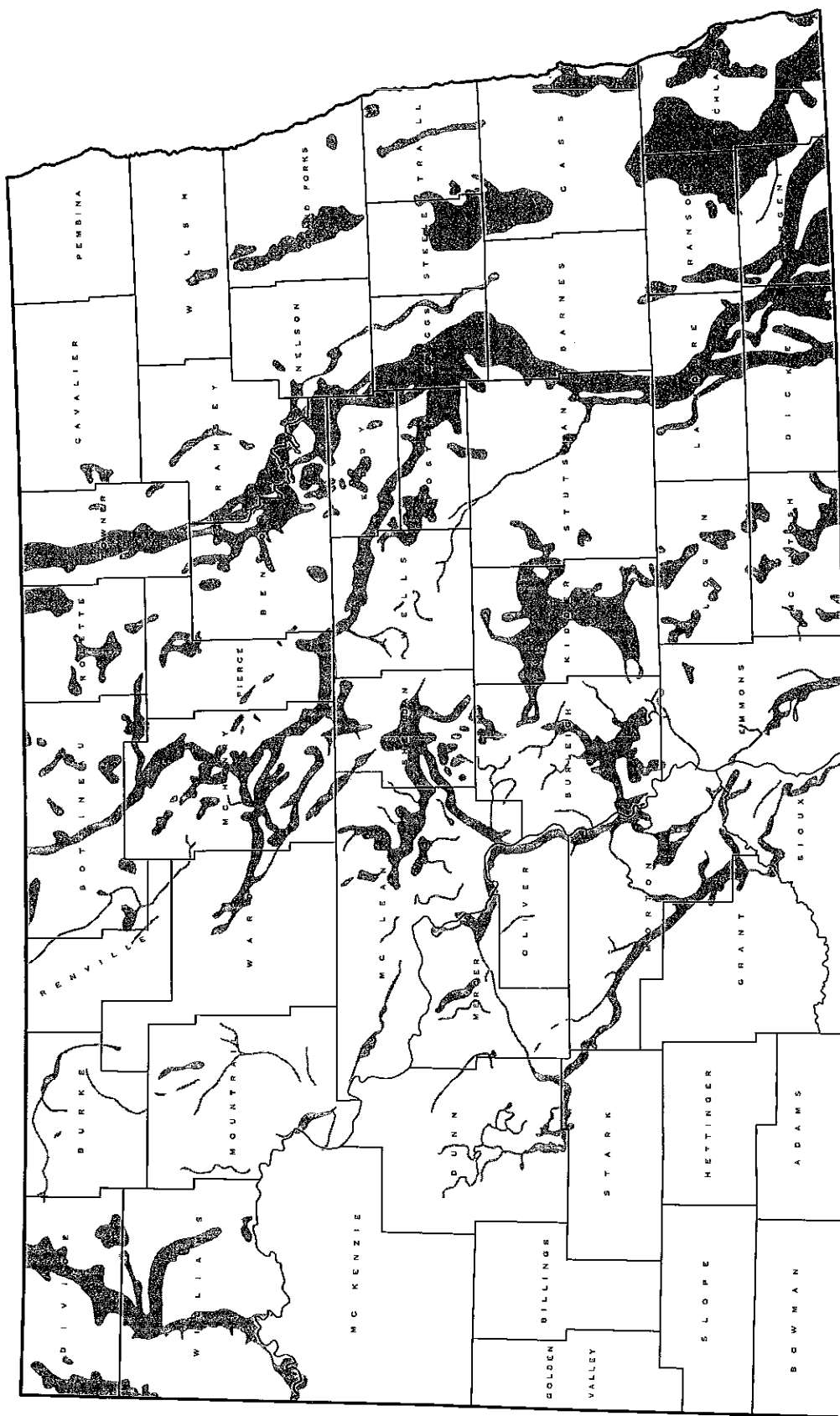
Surface drainage of the area is from west to east through ephemeral channels into the Little Missouri River. Surface water is available in small quantities. Small reservoirs between 5 and 12 acre-feet in size provide water for livestock and wildlife uses. Water quality is the major limiting factor for water use because of the high dissolved solids in the reservoirs and streams. Due to the relatively high sediment loads, reservoirs can be expected to last ten or twenty years before they silt in.

Surface waters are a sodium sulfate type with the following range of constituents: total dissolved solids (472-3840 mg/l), pH (5.5-9.8), sodium (59.5-886 mg/l), and sulfate (125-230 mg/l).

None of the freshwater aquifers that are important in the surrounding area are present in the Big Gumbo. Some of the sandy soils in the Big Gumbo area serve as recharge areas for the regionally important Fox Hills aquifer as this formation dips down and extends over much of eastern Montana, western North Dakota, and parts of northwestern South Dakota. The Little Missouri Scenic River runs along the eastern border of the public lands. Alluvium along this river contains ground water that is pumped for domestic use.

The Lost Bridge area is located in the unglaciated badlands along the Little Missouri Scenic River. Drainage areas are all less than 25 square miles and slopes are generally steep. The streams in the area are small and ephemeral, flowing as a result of snowmelt or intense rainstorms. A majority of the annual runoff occurs during the spring and early summer.





Location of major buried-valley aquifers in North Dakota (Winter et al. 1984).

**FIGURE 3-5**

The deciduous riparian woodlands occur along streams and rivers. Major species are the same as those in wooded draws but cottonwood is often dominant. The best developed stands of this type occur along the Missouri River.

Shelterbelts occur throughout the planning area and are usually associated with farm buildings and houses. Major species in the shelterbelts include Colorado blue spruce, ponderosa pine, cottonwood, American elm, green ash, box elder, Siberian elm, common lilac, and caragana.

The main juniper woodlands occur on the Williston CSA and are associated with the rough topography just north of Lake Sakakawea. The primary species is Rocky Mountain juniper. Understory species includes dwarf juniper, western snowberry, bedstraw, western wheatgrass, and long-beaked sedge.

### **Moist Shrublands**

The moist shrublands within the study regions occur as two types: tall shrublands and low shrublands. The tall shrublands type is characterized by mixed stands of chokecherry, hawthorn, buffaloberry, silverberry, and Juneberry. Common herbaceous species include smooth brome and Kentucky bluegrass. The tall shrub type usually occurs along drainages and in sheltered shallow draws.

The low shrubland type also occurs along drainages, but requires less moisture than the tall shrubland type. The dominant species are western snowberry and western wild rose.

### **Wetlands**

Among the remaining native habitat types, the most important are certainly the wetlands. Wetlands are prevalent only in the Velva, Divide, Fortuna, and Niobe CSAs. Vegetation on wetlands that only temporarily have water is similar to that of native prairie. A slight increase in moisture will support fowl bluegrass, prairie cordgrass, baltic rush, wild licorice, showy milkweed, and curly dock.

If standing water is present throughout the entire growing season, semi-aquatic species like slough sedge, Nuttall's alkaligrass, knotweed, sloughgrass, and prairie cordgrass, are dominant species.

On semipermanent lakes major species include common cattail, hardstem bulrush, softstem bulrush, chairmaker's rush, and common spikerush.

Alkaline lakes support fowl bluegrass, hardstem bulrush, softstem bulrush, and Nuttall's alkaligrass. The alkaline lakes are characterized by salt encrustations on the draw-down zone of the wetland.

### **Badlands**

Vegetation in the badlands includes rubber rabbitbrush, longleaf sagebrush, black greasewood, big sagebrush, and silver sagebrush. Common grasses include bottlebrush squirreltail, western wheatgrass, and thickspike wheatgrass.

### **Dry Shrublands**

Dry shrublands usually occur in association with badlands vegetation; forming a mosaic of shrubland types. Within the study regions, dry shrublands occur on the northern part of the Hanks CSA, on the northeastern and extreme western part of the Dickinson CSA, and on the northern portion of the Bowman CSA. The major shrub species are silver sagebrush, big sagebrush, rubber rabbitbrush, and black greasewood. The most common half shrub is broom

snakeweed. Common grasses include various species of wheatgrass.

### **Threatened and Endangered Plant Species**

At this time, there are no federally listed threatened or endangered plant species in North Dakota (Smith 1985). However there are two species listed as "Category 2" which means that there is insufficient information at present to judge their status. These are: yellow cress and prairie fringed orchid. The former species has yet to be found in North Dakota, and the latter, is locally abundant in the southeastern part of the state.

### **Surface Lands**

Scattered tracts of BLM surface lands have all of the habitat types discussed above. Big Gumbo is dominated by native prairie with small areas of dry shrublands and badlands. In the Lost Bridge area there is native prairie, badlands, deciduous riparian, and wooded draw types. Wetland habitats occur on a number of small tracts north and east of the Missouri River.

Ecological range condition-expressed as excellent, good, fair or unclassified-reflects the current vegetation composition of the rangeland in relation to the potential climax plant community. Range condition for BLM grazing lands is 85 percent in good-excellent, 7 percent in fair, and 8 percent in unclassified condition (see Table 3-1 in USDI 1984a). The trend is upward on the three AMP allotments, but trend information on the rest of the allotments is limited. Trend is stable or better on isolated tracts.

Over 60 percent of the BLM rangeland is intermingled with private rangeland. The SCS periodically rates range condition for private rangeland on a statewide basis. They currently report over 60 percent of the private rangeland in good to excellent condition and 39 percent in fair and poor. Long-term trend is upward (Gerbig 1983, Runner 1983, USDA, SCS 1980).

Allotments listed as unclassified have limited or no inventory data. Most of these tracts are located along the Missouri River, beneath Lakes Sakakawea and Oahe, and in the central pothole region of the state. There are about 10,000 acres of wetland and submerged acres and about 3,000 acres of other land suitable for grazing.

Leafy spurge is the primary noxious weed known to exist on BLM lands in the District. It is found on several tracts in McHenry County, on one tract in Williams County, and on one tract in Cavalier County. The BLM District Office recently started a leafy spurge control in cooperation with grazing lessees.

## **WILDLIFE**

Although BLM is committed to managing habitat for the benefit of all wildlife species, certain laws, regulations, and policies tend to focus attention on the habitats of important groups. The wildlife discussions in this document will focus on: federally-listed threatened and endangered species, potential state-listed threatened and endangered species, migratory bird species of high federal interest, and species of high interest to the State of North Dakota. Most species in these groups are equally likely to be encountered in CSAs, on surface lands, or on other mineral estate.

Species lists and scientific names are presented in Appendix M.

Ring-necked pheasants and gray partridge are common where there is cover adjacent to agricultural lands. These are two of only a few species that increase with the conversion of native habitats to agricultural lands.

## Big Game

White-tailed and mule deer populations in North Dakota are managed by the NDGFD in permanent deer management units. About 9.9 percent of the units in the planning area are in CSAs, and about 0.2 percent are on BLM surface lands.

Projected white-tailed deer populations have generally increased in the planning area since 1953. This is especially true in the southwest portion of the planning area and along the Missouri River (McKenzie and Samuelson 1982). The most recent complete population inventory (1981-1982) gives average white-tailed deer densities of about 0.7 deer per square mile in the planning area.

Mule deer populations have been monitored in selected study areas in western habitats. These data reveal populations that have increased to 1982 and have possibly reached a stable point at about 6.5 deer per square mile (McKenzie and Samuelson 1982).

Pronghorn are managed in units different from those for white-tailed and mule deer. A total of 17.4 percent of all management units in the planning occur in CSAs and about 0.4 percent occurs on public lands.

Pronghorn densities as of 1984 are highest in the extreme southwestern corner of the planning area at 2.3 per square mile. Densities decrease to the north and east to much less than one per square mile (Samuelson 1985).

Pronghorn populations in the planning area reached a peak of over 14,000 in 1964 and decreased to an all time low of 1246 in 1979. Since then, numbers have recovered somewhat but are still lower than the long-term average. The trend has been downward in most units and stable in only a few. Only in one unit in Bowman County have numbers shown a long-term increase (Samuelson 1985). The steady loss of native grasslands may be responsible for this trend.

## Raptors

Several inventories of nest sites of golden eagles, prairie falcons, and ferruginous hawks have been conducted in the area over the years (Grier et al. 1978, Gaines 1980, 1981a, b, Bosch 1981, Ward et al. 1985, Harrington 1984). Currently, only a few potential nesting areas have not been inventoried. Nesting populations are calculated to be 95 + 79 pairs of golden eagles and 125 + 94 pairs of prairie falcons in the planning area (Allen 1985). No estimate of the nesting ferruginous hawk population is available.

Only limited data are available for other raptor species listed in Appendix M. Several nest sites of Swainson's hawks have been located. Although this species is currently under consideration for listing as Threatened or Endangered, it is common in the area. Because of its abundance, its adaptability to various types of nest sites, and the abundance of suitable sites, no systematic inventory or monitoring effort has thus far been carried out.

Several nest sites of burrowing owls have been located during inventories of this species and incidental to inventories of black-tailed prairie dog towns. Nationally, populations of this species have been declining but no population or trend data are available for the planning area.

Population densities and trends of other raptors in Appendix M are unknown.

## Black-Tailed Prairie Dogs

Over 600 known and potential (interpreted from aerial photographs) prairie dog towns have been located in North Dakota. Information on these towns from a variety of sources has been compiled by USFWS because of the relationship between dog towns and black-footed ferrets. Currently, only five towns occur in CSAs and only two on public lands.

## Other Nongame Species

Populations of the other species listed in Appendix M are known only generally (Stewart 1975, McKenna et al. 1982, McKenna and Seabloom 1979, Armbruster 1983).

## Surface Lands

Most of the species discussed above could occur on scattered tracts of public lands. However, two noteworthy species, sage grouse and elk, occur primarily on public lands.

Sage grouse populations are small and found in the limited area of sagebrush habitat in the southwestern part of the planning area. BLM has its largest contiguous block of surface lands in sage grouse habitat. Sage grouse habitat is marginal due to a lack of good sagebrush for nesting and winter cover and a lack of good brood-rearing habitat. Populations have fluctuated widely since 1964 when studies were begun. The long-term population trend has been stable to slightly downward (Kobriger 1983, 1984, b, pers. commun.).

The elk population near Lost Bridge on the Little Missouri River reached 91 individuals in April 1985. This population is increasing and is hunted.

The Bighorn sheep population in the badlands has increased steadily since 1972. In the fall of 1983 and 1984, 135 sheep were counted (Samuelson 1985a). This population currently may use some of BLM's scattered surface lands in McKenzie, Dunn, and Golden Valley counties. Because much of this habitat is suitable for bighorns, we expect the population to expand more into these areas over future years.

## AGRICULTURE

In the 24 counties located in the western half of North Dakota, cropland acreage is approximately equal to that of range and pasture land. The ratio varies from county to county. For example Renville County has almost 80 percent cropland whereas Billings County has only 15 percent cropland. The region is most noted for its production of spring and durum wheat. Oats, barley, and sunflowers are some of the other important crops grown.

Fifty percent 1,000,000 of North Dakota's cattle are found in this region. Dairy cattle make up 10 percent of this number.

## Coal Study Areas

Ninety-five percent of the CSAs is used either for livestock grazing or crop production. Most of the land (70 percent) is

**TABLE 3-9**  
**NORTH DAKOTA BLM-ADMINISTERED**  
**LANDS AND MINERALS<sup>1</sup>**

County	Total Mineral Acres <sup>2</sup>	Coal Acres	Oil & Gas Acres	Surface and all Mineral Ownership Acres
Adams	109,262	108,062	5,715	40
Barnes	7,415	7,415	7,415	5
Benson	4,371	4,211	4,251	89
Billings	53,806	51,103	4,646	680
Bottineau	6,327	6,327	6,127	1
Bowman	246,441	231,447	61,243	32,568
Burke	81,664	80,626	5,709	
Burleigh	40,397	13,174	863	40,957
Cass	480	320	320	
Cavalier	9,724	9,284	9,284	239
Dickey	1,957	1,437	1,437	
Divide	275,312	275,312	9,521	1,666
Dunn	433,407	428,703	47,823	15,989
Eddy	3,364	3,364	3,404	54
Emmons	13,469	13,368	13,469	599
Foster	4,833	4,513	4,513	
Golden Valley	181,045	180,099	10,418	2,358
Grand Forks	520	520	520	40
Grant	99,625	97,970	14,059	584
Griggs	2,915	2,915	2,915	
Hettinger	241,915	238,137	8,152	
Kidder	11,937	11,937	11,937	1,520
LaMoure	10,778	9,498	9,498	
Logan	8,505	8,465	8,505	523
McHenry	21,209	20,238	17,568	3,233
McIntosh	4,656	4,656	4,656	213
McKenzie	567,353	561,092	16,044	1,629
McLean	129,988	128,596	14,315	599
Mercer	167,869	165,949	4,410	459
Morton	64,273	64,273	458	199
Mountrail	306,438	302,436	17,154	997
Nelson	2,083	2,083	2,083	
Oliver	95,588	94,191	4,110	112
Pembina	2,341	2,341	2,341	
Pierce	4,143	4,043	4,143	166
Ramsey	10,457	10,297	10,297	
Ransom	720	720	720	
Renville	16,579	16,419	6,536	78
Richland	2,199	2,199	2,199	
Rolette	3,141	3,061	3,141	
Sargent	2,724	1,444	2,084	
Sheridan	55,265	54,425	12,544	378
Slope	100,411	99,771	1,894	
Stark	167,560	167,360	2,619	
Steele	1,398	998	998	
Stutsman	18,468	17,948	18,148	80
Towner	6,115	5,315	5,315	
Trail	880	880	880	
Walsh	1,669	1,669	1,669	11
Ward	113,121	113,121	8,063	266
Wells	13,064	13,064	13,064	
Williams	497,406	492,624	18,886	1,321
<b>TOTALS</b>	<b>4,226,984</b>	<b>4,166,640</b>	<b>460,394</b>	<b>67,520</b>

<sup>1</sup>Does not include federal minerals located under USFS, USFWS, Army Corps of Engineers and other federal surface management agencies.

<sup>2</sup>Includes total, fractional or segregated interest.

Approximately 330,800 acres of public lands, excluding USFS administered lands, have been withdrawn since 1903 (Appendix J). A withdrawal is a formal action withholding an area of federal land from settlement, sale, location, or entry under some or all of the general land laws. The purpose is for limiting activities in order to maintain other public values, reserving an area for a particular public purpose, or transferring jurisdiction of an area from the BLM to another federal agency.

Approximately 8,000 acres were classified under the C & MU Act of 1964 (Appendix J). Classifications under the C & MU Act identified many areas of public land as suitable for retention in public ownership and closed substantial portions to various forms of disposition. These classifications were essentially obviated when Congress passed FLPMA. Other areas were designated suitable for a specific type of disposal; e.g., R & PP Act. All C & MU classifications in the District were terminated in 1982 and 1983. Removal of the classifications was an administrative action and has caused no adverse impacts.

On July 15, 1985, the NWF filed suit in the U.S. District Court for the District of Columbia alleging BLM's withdrawal review activities: (1) failed to analyze revocations in land use plans and EISs, (2) are being conducted without regulations, (3) fail to provide for public participation in decisionmaking, and (4) fail to provide for Congressional and Presidential review of proposed revocations. The NWF requested a preliminary injunction to prevent actions affecting withdrawal classification or designation in effect on January 1, 1981, and to execute an emergency reinstatement of withdrawals, classifications (including the C & MU classifications), or other designations in effect on January 1, 1981. The case resulted in Civil Action No. 85-2238 by which U.S. District Judge Pratt enjoined the BLM from modifying, revoking or terminating, under authority of FLPMA, any existing withdrawals or classifications in effect January 1, 1981. The Order precluded all action prohibited by the specific provisions of the withdrawals or classifications.

Two withdrawals are affected by the Order. One is withdrawal case M-8099 (ND), EO No. 8124 establishing Lake Oliver Migratory Wildlife Refuge. Federal interest in the land was through a revokable easement. The action had no effect on surface or mineral estates, which have been and remain in private ownership. The revocation was in effect February 5, 1982. The other is case M-10815 (ND), EO No. 7799 covering the Lower Souris National Wildlife Refuge, was partially revoked to remove a cloud on the surface title of the lands. The revocation was effective March 18, 1982.

Access to public land is not an issue in the District. In North Dakota the courts have affirmed section lines provide legal access irrespective of the presence of a road or trail. Most tracts of public land have legal access although in many cases there is no road or trail. In some cases legal access is arduous and lengthy.

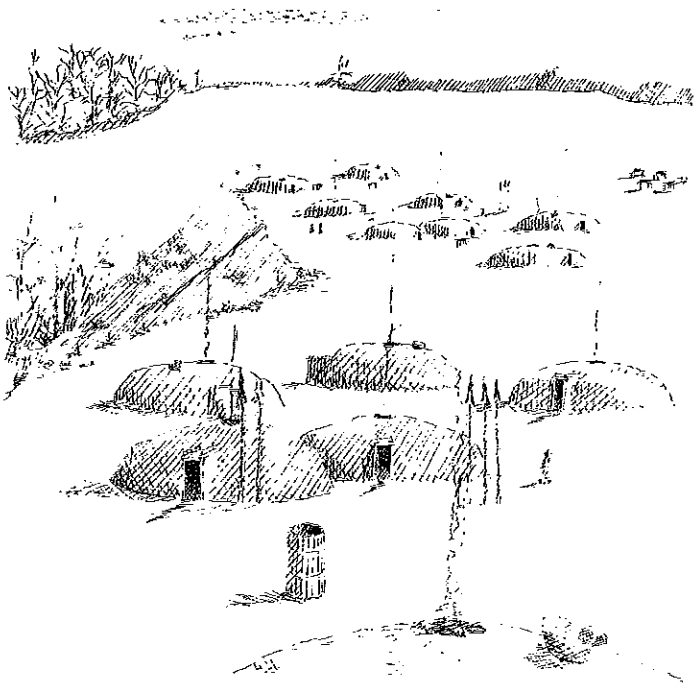
There are no officially designated corridors in the District. There are numerous rights-of-way in the District; some utilize the same corridor.

The NDPSC has siting authority for energy conversion and transmission facilities powerlines larger than 115 KV and transportation pipelines as defined in the North Dakota Siting Act. It has designated exclusion and avoidance areas for these facilities. Exclusion areas are removed from consideration while avoidance areas are utilized only if there are no reasonable alternatives. No public lands are within exclusion areas. All public lands are designated "Areas of Recreational Significance" by the NDPSC and are classified as avoidance areas.

### Big Gumbo Area

The Big Gumbo area is located in the southwest portion of Bowman County, North Dakota, between the Little Missouri River and the Montana state line. It is the largest solidly blocked area of public lands administered by the BLM in North Dakota and consists of 22,164 acres.

ries are completed either for the purpose of BLM activity planning or in response to a specific project proposal. The following site descriptions are provided as examples of cultural resources which are likely to be encountered during future actions and form the basis of the projections of impacts presented later in this document.



## Knife River Flint Primary Source Area

The primary source area of Knife River Flint (KRF) contains the largest known flint quarrying activities in North America (Loendorf, Ahler, and Davidson 1984). The area has been roughly defined through aerial photography of quarry sites located in Dunn and Mercer Counties (Clayton et al. 1970). The primary source area for KRF extends 43.5 miles east-west and 25 miles north-south, primarily along portions of the Knife and Heart Rivers. There are other locations in North Dakota where KRF has been identified, but archaeological evidence indicates the most intensive prehistoric quarrying activities occurred within the primary source area.

Quarry sites typically consist of depressions, 10 feet to 66 feet in diameter and range in depth from a few inches to more than 10 feet. The stone extracted from KRF quarry sites is a honey- to brown-colored translucent stone which aboriginal populations used to produce stone tools. Stone tools manufactured from KRF have been found as far north as southern Alberta and Ontario extending south to Colorado and Ohio. The earliest known use of the quarry dates to 12,000 years ago and continued to the historic period. Because of the magnitude of the quarrying activity, its antiquity, and its widespread distribution via trade or transport, the archaeological community strongly supports the assessment that this resource is significant at a national level.

Twenty-nine quarry sites are reported for the primary source area of KRF. Sixteen of the 29 lie within an eligible National Register District or about 5 percent of the primary source area. Half of the 16 are associated with the Lynch

quarry, the type site. Also within the boundaries of the district are 31 workshop areas, 5 camp sites, 1 tipi ring, and 1 rock cairn. These sites have the potential to yield significant information on the prehistory of North Dakota. Specifically, they can answer questions dealing with quarry procurement strategies, lithic reduction techniques, and the role of KRF in trade networks throughout prehistory.

It is estimated the Dunn Center CSA contains 1300 aboriginal KRF sites. Many of these sites, which are part of the KRF primary source area, are quarries or are quarry-related.

The data recovered from excavations of KRF quarry or related sites has begun to reveal significant information on flintknapping and quarrying techniques of aboriginal groups through time. Future investigations are expected to address the range of functional activities conducted at the quarries and related sites and how those activities were integrated into the settlement systems (e.g., subsistence activities) and social structures of aboriginal groups within and outside of the primary source area of KRF. In addition, this data could reveal how KRF was distributed and the nature of the distribution links facilitating trade and transport of KRF to distant areas.

## Moe Site (32MN101)

The Moe site is situated on the banks of Lake Sakakawea near New Town, North Dakota. The site is described as a series of occupations dating from Clovis to the Archaic (Schneider 1975). Radiocarbon dates and most of the material culture indicate the major occupation occurred during the Archaic period. Due to the high rate of erosion much of site had, prior to investigation, been destroyed. As a result, it is impossible to accurately reconstruct the sequence of occupations.

This site represents one of the few Paleo-Indian sites with primary context in North Dakota. Sites like these, in an undisturbed context, are possible in central and western North Dakota.

## Writing Rock Historic Site

Writing Rock Historic site located just south of Alkabo in the Fortuna CSA represents one of the few examples of rock art in North Dakota. The site consists of boulders inscribed with abstract and zoomorphic designs. Evidence suggests that the designs were carved by aboriginal groups during the Late Prehistoric and Historic periods (Joyes 1978).

Systematic inventory of this area by professional archaeologists is limited; however, local amateur archaeologists have reported aboriginal artifacts and tipi rings from the immediate vicinity.

## Mondrian Tree Site (32MZ58)

The Mondrian Tree Site is located near the Missouri River about four miles downstream from the confluence of the Missouri and Yellowstone Rivers. The site is composed of 8 stratigraphically discrete components dating from the Middle Archaic to Plains Village/Late Prehistoric period (Toom and Gregg 1983). Based on the material recovered, the site represents a temporary hunting/gathering camp where bison, elk, and deer were hunted and plant material was collected and processed.

Thirty radiocarbon dates were obtained from features located within the eight cultural zones. The dates ranged

(McLean, Mercer) are projected to grow while many rural counties are projected to decline in population (NDSU 1985).

Many of the counties in the impact area are sparsely settled; 16 of the 24 counties contained fewer than five people per square mile in 1980. However, in 1980, 50 percent of the area residents lived in urban areas (places of 2,500 or more inhabitants) while only 16 percent were classified as rural farm. By county in 1980, the percent of residents living in urban areas varied from zero in many of the more rural counties to nearly 83 percent in Burleigh County where Bismarck is located. The percent of rural farm population varied from a low of 3.7 percent in Burleigh County to 65 percent in Slope County. In Slope, Billings, Dunn, Sheridan, and Grant Counties more than 45 percent of the population is classified as rural farm (USDC 1983a, 1983b).

One Indian Reservation is located within the primary impact area and another is located adjacent to the impact area. Fort Berthold Reservation is located in Dunn, McKenzie, McLean, Mercer, Mountrail, and Ward Counties. It is home to members of the Three Affiliated Tribes (Mandans, Arikara, and Hidatsa). The reservation had a 1980 Indian population of 2,640, an increase of 150 percent over 1970. Some of this increase was due to return migration of Tribal members. However, conversations with Tribal representatives (1986) indicate the increase was not as great as indicated because the 1970 census resulted in an undercount of Indians on the Reservation. The majority of the Fort Berthold Indians live in the McKenzie and Mountrail County portions of the Reservation. Standing Rock Indian Reservation, which is home to the Standing Rock Sioux, is located directly southeast of the study area in Sioux County, North Dakota and Carson County, South Dakota. This reservation had a 1980 Indian population of 4,800, an increase of 64 percent over 1970. On both Reservations, the Indian population comprises about 50 percent of the total Reservation population (USDC 1974, 1982a; Council of Energy Resource Tribes 1983; Spotted Bear 1986; Dean 1986).

## Employment and Earnings

Data for 1979 and 1984 show services, government, retail trade, and farming and to be the main sources of employment in the impact area. These four sectors of the economy account for nearly 70 percent of the total employment in 1984 with services contributing 22 percent, government 18 percent, retail trade 16 percent, and farming 13 percent. In 1984, five percent of the work force was engaged in mining (including oil and gas). Employment in the impact area increased six percent from 1979 to 1984, compared to a three percent increase statewide. Mining employment increased 50 percent while construction decreased 15 percent, agriculture decreased 12 percent, and manufacturing decreased nine percent. Transportation and public utilities, services, and wholesale trade grew 28 percent, 24 percent, and 14 percent, respectively, during that time period.

The distribution of employment, by source, varies a great deal among the counties. In some rural counties such as Divide, Dunn, Grant, Sheridan and Slope, agriculture contributed more than 40 percent of the employment in 1984. In other areas that are more urban or where mining is occurring, such as Burleigh, Mercer, Stark, Williams, and Ward, the contribution of agriculture was less than 10 percent in 1984. The retail trade and service sources in Burleigh, Morton, Stark, Ward, and Williams contribute sub-

stantial proportions of employment because these counties contain the regional trade and service centers of western North Dakota. Government contributes nearly 10 percent in each county and over 20 percent in Burleigh and Ward. Some counties (Billings, Burke, Dunn, McKenzie, Stark, McLean, and Williams) received over 10 percent of their employment from the mining sector in 1984.

Increases in employment between the years 1979 and 1984 occurred in some counties while losses in employment occurred in most. Mercer County had an increase of 52 percent, Williams County 25 percent, McKenzie County 18 percent, Stark County 14 percent, Burleigh County 9 percent, and Ward County 4 percent. The sources that grew included mining, government, and services. Employment losses occurred in all other counties and ranged from less than 1 percent (Golden Valley, Bottineau) to more than 10 percent in Billings County. Loss in farming employment occurred in every county in the impact area. Some counties also sustained large losses from the government, construction, retail trade, and service sources.

In 1979 and 1984, government and services were the major sources of earnings in the impact area. In 1984, government and services each accounted for 18 percent of the earnings, agriculture accounted for 10 percent, and mining, construction, and retail trade contributed 9 percent each. Earnings in the impact area increased 52 percent from 1979 to 1984 (in current dollars) while they increased 46 percent for the entire state during the same time period. Mining, transportation, public utilities, and services all increased more than 90 percent. Construction showed the smallest increase, 16 percent.

The distribution of earnings, by source, varies among the counties. The majority of the counties derived the largest proportion of their earnings from agriculture while a few derive their largest proportion from mining or services. Changes in earnings from 1979 to 1984 ranged from little change in Grant County to increases of over 60 percent in McKenzie, Mercer, Renville, Stark, and Williams Counties. These increases were generally due to increases in agricultural or resource related activities (mining, construction) (USDC 1986).

## Minerals Taxation

North Dakota has a coal severance tax and a coal conversion facilities privilege tax. The coal severance tax is based on the amount of coal mined. Twenty percent is distributed among coal-producing counties (and some adjacent counties that are affected), and 50 percent is used to supply loans and make grants to coal impacted cities, counties and school districts. The remaining 30 percent is deposited in the State General Fund. In FY85 the coal severance tax generated 25.4 MM dollars in revenue.

The coal conversion facilities privilege tax is based on the amount of electricity or gas produced. The tax is distributed, in part, to the county in which the plant is located. Receipts in FY85 were approximately 12.7 MM dollars (North Dakota Tax Department 1984, 1985).

## Payments in Lieu of Taxes

Payments in Lieu of Taxes (PILT) are made annually by the Federal government to counties containing Federal acreage which qualifies for these payments. Payments are designed to supplement other Federal land receipt sharing

natural resources and protection of the natural environment, as well as reducing unemployment and increasing job variety, were high priorities. These surveys tend to verify earlier studies (USDI 1982) which indicated that a large segment of the population of the region favored some level of energy development but often qualified this approval. Concern for the protection of agricultural lands and some guarantee of reclamation potential were frequently listed as prerequisites for approval. Job opportunities generated by development and expansion of local economies were most often cited as reasons for favoring coal development. Many residents, of smaller communities in particular, were concerned about the health of their local business centers and wanted to see the economic base of the area expanded (USDI 1982).

The residents of the rural portions of affected counties were more apt to express opposition to development (USDI 1982). Their concern for the conservation of agriculture and the protection of land, air and water quality both on and

offsite was often very strong. Some area farmers and ranchers have organized in opposition to development. They question the need for coal leasing and the fairness of BLM's surface owner consultation process, as well as expressing environmental concerns. In addition, negative impacts of development such as increased population levels, crowding of schools and increased incidences of crime were frequently given by small town residents as reasons for opposing coal leasing (USDI 1982).

Interviews with representatives of both the Fort Berthold and Standing Rock Indian Reservations indicate increased employment for Tribal members is one of their major objectives. If off-Reservation coal development were to occur, Tribal members would likely try to obtain employment at the mines and facilities. Concerns regarding off-Reservation coal development include air quality and problems with reclamation (Spotted Bear 1986, Murphy 1986).



A black and white photograph of a large, rectangular, wire-mesh enclosure, possibly a cage or a large-scale experimental setup. The enclosure is made of a grid of vertical and horizontal bars. In the foreground, a person is standing, providing a sense of scale. The background is dark and indistinct.

## CHAPTER FOUR

# ENVIRONMENTAL CONSEQUENCES



# CHAPTER FOUR

## ENVIRONMENTAL CONSEQUENCES

### INTRODUCTION

This chapter presents an analysis of the effects of implementing each of the four alternative management plans. Projected impacts to individual environmental conditions or resource management programs are included under each alternative.

Impacts to resources resulting from various coal management actions are addressed for the entire planning area in this chapter. Impacts specific to the development of a surface coal mine and related power generation facility are presented in Appendices H and I. The analyses of coal-related impacts presented in this chapter are based on the impact assessments presented in the two appendices.

Impact assessments refer to 20 coal unsuitability criteria by number. Descriptions of the unsuitability criteria, as well as the other three coal screens, are provided in Appendices B through E. The results of the application of the coal screens specific to each of the 24 CSAs are presented in Appendices B through G. A summary table of the application of the four coal screens is provided in this chapter following the discussion of impacts for each alternative.

### ALTERNATIVE A—NO ACTION OR CONTINUATION OF PRESENT MANAGEMENT

#### Air Quality

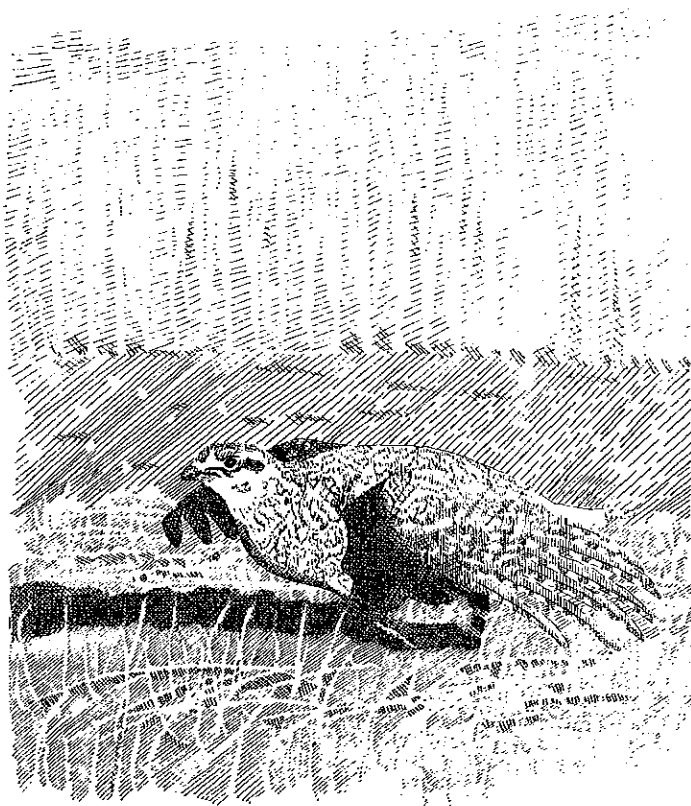
The identification of 391,179 acres as acceptable for coal leasing and possible development of new mines and facilities in up to 13 CSAs, and application of Montana BLM Standard Stipulations on all future oil and gas leases and Standard Conditions of Approval on all APDs, are the primary factors impacting air quality.

Appendix H illustrates air quality impacts for a typical North Dakota mine and Appendix I illustrates air quality impacts for a mine and end-use facility. The air quality impacts identified in Appendix I show that any further coal development in North Dakota would further utilize the increment for  $\text{SO}_2$  which may be fully consumed under certain meteorological conditions.

Prior to any leasing of federal coal a detailed site-specific analysis of potential air quality impacts would be conducted. Prior to development of any mine or large scale end-use facility, NDSOH would require a detailed permit review for mine or end-use facility application.

Continued application of the air quality stipulations included in the Standard Conditions of Approval for all APDs (see Management Guidance Common to all Alternatives) would help minimize the human safety risks of  $\text{H}_2\text{S}$ , as well as provide necessary gas content information to be used in future air quality studies.

All releases of  $\text{H}_2\text{S}$  and  $\text{SO}_2$  would affect the air quality of the local area; primarily through the creation of offensive odors. The impacts to air quality beyond the local area are



not yet fully documented. It is evident that there is great potential for AAQSS and PSD increments to be exceeded in the Williston Basin. Exceedance of these standards has occurred on a local scale and could occur on a regional scale under present conditions and management practices.

Further studies need to be conducted for the oil and gas fields within the district to establish the level of ambient air contamination. Also, studies of cumulative impacts are needed to establish the effects of all the fields on the air resource, including effects on the Theodore Roosevelt National Park and Class II areas.

#### Minerals

##### Coal

The management action significantly affecting the coal resource is the finding of 391,179 acres (7,656 MM tons) as acceptable for further consideration for leasing or exchange and potential leasing and development.

Under this alternative 607,131 acres (approximately 12,168 MM tons) of federal coal were identified as having coal development potential. A total of 215,952 acres (4,512 MM tons) were eliminated from areas acceptable for further consideration for leasing or exchange. Following the application of the unsuitability criteria, multiple-use trade-off, and surface owner consultation screens, 391,179 acres of federal coal were found acceptable for further consideration for leasing or exchange (Appendices B through G).

Following the application of the coal screens, 13 CSAs contain sufficient tonnages of federal coal in relatively

crops, and steepness of slope. If leased and mined, the areas would have problems with erosion, stability, revegetation, and return to approximate original contours in the short term. They would eventually be reclaimed in the long term but with an irreversible and irretrievable loss of some soil material. Most of the problem areas with steep slopes in the West-Central MFP would be found in what is now the Antelope and to a lesser extent the Dickinson CSAs. North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would prevent some, but possibly not all, of the steep slopes from being disturbed by surface mine operations.

A total of 41,180 acres of steep slopes were eliminated from further study in the Southwest and McKenzie-Williams MFPs. Therefore, there would be no significant impacts to soils and topography on these steep areas from surface coal mining.

The impacts to the soil from mine development (Appendix H) would cause a short-term loss in soil productivity. However, the proper recontouring of overburden and replacement of topsoil and subsoil as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would return productivity to acceptable levels in a relatively short number of years (Appendix H, Table H-1). No major long-term impacts to the soil would be anticipated.

### Surface Lands

The exchange of land would not impact the soil resource in most cases, assuming no change of use. Soils on tracts of land disposed to other federal agencies would basically remain the same. If tracts are sold or otherwise transferred to the private sector, erosion could be accelerated by overgrazing or a change in land use. The type of change made; e.g., agriculture and road or building construction, would determine the amount of erosion. This is expected to be a minimal loss since a significant switch to agriculture or construction is not likely. Public lands retained under this alternative would see little impact to the soil resource.

Continuation of the present range management program under this alternative would have a positive impact to soils. A long-term increase of approximately 6.5 percent in vegetative production would result in less soil erosion due to the added cover.

Unrestricted ORV use on public lands would cause some soil loss due to erosion and compaction. Most disturbed areas would stabilize within two to three years because of lack of use. Small areas would remain compacted and subject to erosion in the long term because the same ORV trails would receive repeated use.

### Other Mineral Estate

Oil and gas exploration normally disturbs a small area of soils along a seismic line and drilling site. With proper cleanup and handling of soil, this activity causes minor short-term negative impacts. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment, disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Stipulations on oil and gas leases would minimize impacts to soil resources by prohibiting activities during wet or muddy periods and requiring erosion control on slopes of erodible soils over 20 percent. There would be no soil disturbance resulting from development of federal oil and gas on the 1,096 acres protected by NSO stipulations (see Appendix K).

## Hydrology

The identification of 391,179 acres as acceptable for further consideration and assumed coal leasing and development, unrestricted ORV use on 67,520 acres of public lands, and the application of Montana BLM Standard Stipulations to all new oil and gas leases are the primary change agents affecting hydrology. The disposal of up to 9,580 acres of lower-value federal surface lands and continuation of present rangeland management would have minor impacts to hydrology.

### Coal Study Areas

In the previous land-use plans of McKenzie-Williams, Southwest, West-Central, and Golden Valley MFPs, 92,096 acres were considered unsuitable under unsuitability criteria 16 and 19. Under multiple-use tradeoff, a total of 10,520 acres of buried-valley aquifers were protected along with 54,492 acres of Dickinson's municipal watershed and the proposed watershed for add-on to the current watershed. In the McKenzie-Williams MFP a Lake Sakakawea buffer was established under multiple-use tradeoff for Williston and Tobacco Garden CSAs, consisting of 36,387 acres.

Under criterion 16, 3704 acres are considered unsuitable for six CSAs. These areas protect losses to downstream occupants of flood plains.

Under criterion 19, 88,392 acres are considered as a preliminary determination of AVFs. The area determined was the maximum extent of the AVF.

In addition to those acreages under unsuitability criteria, another 101,399 acres were considered unacceptable for further consideration for coal leasing under the multiple-use tradeoff screen. This determination would protect the area surrounding Lake Sakakawea in two CSAs, buried-valley aquifers in four CSAs and the City of Dickinson's municipal watershed and proposed add-on watershed.

Appendix H describes the probable major impacts of coal mining to the hydrologic resources of the planning area.

Criteria 16 and 19 are not adequately applied to all of the CSAs under this alternative. In some cases AVFs are not protected and in other areas AVF delineations were too extensive. Because of this inadequacy, AVFs which are productive agricultural lands may not be protected. Inadequacies of applying criteria 16 and 19 are corrected in the other alternatives.

### Surface Lands

Minor impacts to the water resources would occur by the disposal of up to about 9,580 acres of lower-value scattered tracts. Disposal to other federal agencies would have no short-term impacts but should have positive long-term impacts due to the acquiring agency being better able to monitor and manage lands that are physically closer.

Disposal of lands to individuals whose primary interest is not protecting the water resources would have either no impact or minor negative long-term impacts, because high-value tracts along major rivers with high watershed value

production, an area usually less than an acre would remain stripped of soil and out of crop or grass production until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Continued application of Montana BLM Standard Stipulations on all new oil and gas leases would minimize negative impacts to vegetation by providing for erosion control and revegetation of disturbed sites. There would be no vegetation loss resulting from development of federal oil and gas on 1,096 acres protected by NSO stipulations.

## Wildlife

The finding as acceptable and assumed leasing and development of 391,179 acres of federal coal, including 47,373 acres of woody draws, the application of Montana BLM Standard Stipulations on oil and gas leases on 460,394 acres, and unrestricted ORV use on 67,520 acres of public lands would have substantial impacts on a variety of high priority wildlife species and their habitats. The disposal of up to 9,580 acres of lower-value federal surface lands and continuation of present range management would have minor long-term impacts.

### Coal Study Areas

No federally-listed threatened and endangered species would be affected by this alternative. The bald eagle, peregrine falcon, and whooping crane migrate through the area but their use of the planning area is erratic. No interior least terns, black-footed ferrets, or piping plovers are known to breed in the CSAs. However, they may occur on scattered tracts (see below).

In previous land-use plans (McKenzie-Williams, Southwest, and West-Central MFPs) no acreages were classified unsuitable under the wildlife unsuitability criteria 9, 10, 11, 12, 13, 14, and 15. A total of 4,520 acres were protected under the multiple-use tradeoffs (Appendix D), but decisions on unsuitability were postponed until more data were available.

Wildlife data are now adequate for determinations of unsuitability. No habitats were considered unsuitable under criteria 9, 10, and 12. Under unsuitability criteria 11, 13, 14, and 15, a total of 76,340 acres of wildlife habitat are considered to be unsuitable for further consideration for coal leasing (Appendix C). In addition, another 1,636 acres are considered unsuitable under criterion 1 as it applies to wetlands under management for waterfowl production by the USFWS. Thus, the total acreage unsuitable due to wildlife values is 77,976 acres. A more detailed explanation of the habitats protected under criteria 11, 13, 14, and 15 follows.

Under criterion 11, 6,145 acres (Appendix C) are considered unsuitable due to golden eagle nest sites and buffer zones. These occur in Tobacco Garden and Williston CSAs. Buffer zones include the nest site (typically a badlands cliff area), woody draws, native prairie, and, in some cases, agricultural lands.

Under criterion 14, 2,491 acres are considered unsuitable. These acreages occur in two CSAs. The habitats protected are ferruginous hawk nest sites and their buffer zones.

Under criterion 15, 67,704 acres are considered unsuitable. These are predominantly large blocks of contiguous woody

draw habitats in the Williston (50,136 acres), and Tobacco Garden (17,248 acres) CSAs, where a variety of high priority wildlife species occur, especially big game.

Assuming a moderate pace of development and realizing that only a small portion of the lands in a mine area are actually disturbed at any time (Appendix H) short- and long-term impacts on wildlife would be significant but local.

Suitable acreages in the CSAs are comprised mainly of agricultural lands and some native prairie of lower quality. Agricultural lands can be reclaimed effectively. Productivity of native prairie may be reclaimed in the short term; however, the natural diversity of native prairie may only be achieved in the long term (Appendix H). Woody draws may never be reclaimed to their original character. All reclamation would extend into the long term. Thus, the most significant long-term impacts would occur to species occupying the 47,373 acres of woody draws that could be mined under this alternative.

### Surface Lands

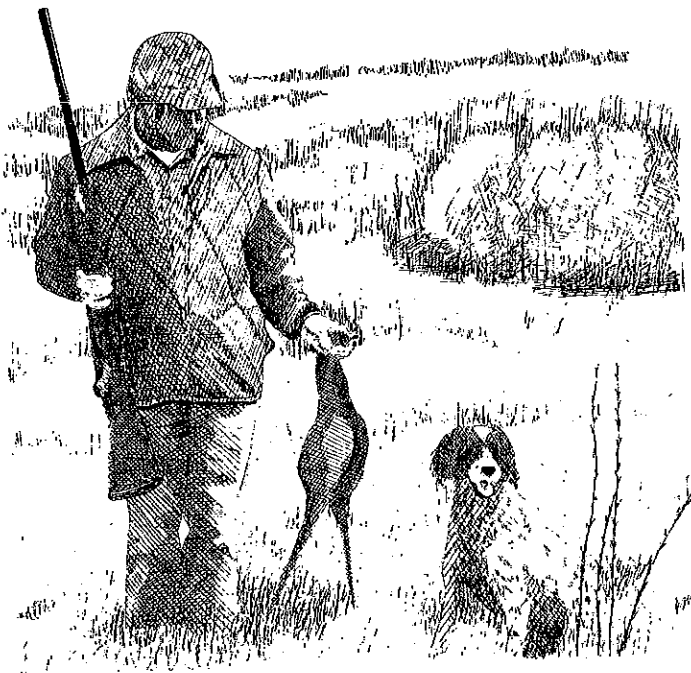
The disposal of up to 9,580 acres of lower-value scattered surface tracts would have only minor impacts on wildlife. Disposal of lands to individuals or organizations who are primarily interested in wildlife management would have positive long-term impacts on wildlife. Disposal to individuals or organizations whose primary interest is not in managing wildlife would have either no impact or minor negative long-term impacts because high-value tracts would be retained. Under disposal, the future enhancement of these habitats would be the main opportunity foregone. For example, as long as these lands are in federal ownership, it would be possible to construct wetlands, plant trees, fence, or do other project work at some future time. Disposal also would forego the opportunity to carry out beneficial land exchanges that may emerge at some future date.

The exchange of scattered tracts to provide larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would generally have positive long-term impacts on wildlife. The consolidation of lands in these areas would make management more efficient and allow greater opportunities for enhancing wildlife habitats. In the Big Gumbo area, benefitting species would be pronghorn, sage grouse, raptors, and other species of high interest such as the long-billed curlew. In the Lost Bridge area, key species are elk, raptors and possibly, in future years, bighorn sheep.

Unrestricted ORV use may have significant local impacts on fragile wetland, riparian, and woody draw habitats by initiating or accelerating vegetative loss and soil erosion. Direct loss of terrestrial habitat and loss of quality in aquatic habitats due to sedimentation may reduce local wildlife and fishery populations.

Disturbance and harassment of elk and bighorn sheep on winter and calving/lambing habitats may directly reduce population numbers. The creation of new roads and trails by repeated use also makes more areas accessible to hunters and others who otherwise would not be able or inclined to drive into particular areas. This increases general disturbance of wildlife as well as the potential for poaching. These factors might decrease wildlife populations, especially in local areas.

Continuation of the present rangeland management program would benefit wildlife as a result of minor long-term positive impacts on Category "M" allotments (20,403



hunting pressure on surrounding land; however, after successful reclamation this would be an insignificant impact. Increased population resulting from new mining activities would place additional demands on popular outdoor recreation areas such as Lake Sakakawea and Theodore Roosevelt National Park. Development would also increase demand for community and indoor recreational facilities. Mitigation of development impacts would require additional outdoor, indoor, and community recreation facilities.

Development of portions of the CSAs would have an impact on the visual resources of these areas. Due to the relatively flat terrain of the CSAs, mine and related facilities would intrude into the landscape. In most cases this would be an acceptable intrusion. Mine sites and facilities near the Missouri breaks and Lake Sakakawea would impact the high visual resource values of this area. A protective buffer zone would be necessary to maintain the high visual qualities of this area. Such a buffer zone would be developed following the introduction of a specific development plan.

### Surface Lands

The disposal of up to 9,580 acres would have a minimal effect on recreational resources, because most of these tracts are isolated and access to them is difficult. Many tracts are surrounded by private land where land owner permission for access is uncertain. The consolidation of public land through exchange and exchange pooling would result in more recreational opportunities through the creation of larger, more accessible tracts.

Unrestricted ORV use of surface lands would benefit recreational opportunities in the short-term by allowing greater access to public land. Long-term impacts to ORV use on resources such as vegetation and wildlife would result in the loss of some recreational opportunities, primarily sight-seeing and hunting. However, current ORV use of surface lands is minimal and impacts from future ORV activities are expected to be slight.

### Other Mineral Estate

Oil and gas development under standard lease stipulations would continue to have an effect on recreation by limiting hunting and other dispersed activities in well-developed oil and gas fields and by generally decreasing the quality of dispersed recreation opportunities. This impact may be offset by additional road development that would enhance access to recreational areas. Continued oil and gas development would also increase hunting pressure on areas adjacent to development. Mitigation of impacts to natural resources from oil and gas development under standard stipulations is adequate. The impacts on recreational resources under these stipulations would be minimal.

Oil and gas development under current lease stipulations would have an effect on visual resources. If there is development in presently undisturbed areas, the intrusion of oil and gas facilities would have a greater impact. Mitigation of the impact would be accomplished by requiring the maintenance of the visual qualities of the landscape and ensuring that facilities have proper design, painting, and camouflage to blend in with the natural surroundings.

### Cultural Resources

Management actions significantly affecting cultural resources include the finding of 391,179 acres acceptable for further consideration and assumed coal leasing and development, the application of Montana BLM Standard Stipulations on all federal oil and gas, the disposal of up to 9,580 acres during land pattern adjustment, and unrestricted ORV use on 67,520 acres of public lands.

#### Coal Study Areas

Prior to 1983, unsuitability criterion 7 specified that all sites eligible to or listed on the NRHP shall be considered unsuitable for coal mining. In 1983 BLM modified the scope of criterion 7. The decision excluded sites eligible to the NRHP from protection under criterion 7. A subsequent District Court ruling in 1985 limited protection to all publicly owned sites listed on the NRHP.

Previous MFP decisions are affected by the changes in criterion 7. The Golden Valley MFP found 10 acres unsuitable (A.C. Townley farmstead) for further consideration for coal leasing under criterion 7 and in the West-Central MFP addendum all archaeological sites within the eligible KRF National Register District were excluded from further consideration under criterion 7. Final decision on whether to apply an exception to sections 32 and 34 (also within the district) was deferred until mining plan time and the submission of a mitigation plan. As a result, 2,897 acres were found unsuitable within the eligible KRF District and a decision on the remaining 1024 acres was postponed.

Although criterion 7, as revised in 1983, no longer applies to the 3,931 acres excluded in previous MFPs, these areas still contain regionally or nationally significant cultural resources. It is assumed that the 3,931 acres would remain excluded from further consideration as multiple-use trade-offs.

Inventory data varies in intensity of effort from one CSA to another. Data adequacy problems will be improved at the completion of a Class II survey on five CSAs located in the Southwest and McKenzie-Williams MFP areas. This sample survey, currently in progress, will generate sufficient data to assess the risk of impact from coal leasing and subsequent mining. Using existing regional inventory

Appendix I. The impacts resulting from the development of a mine and facility is summarized below.

Thirteen CSAs capable of supporting at least one new mine and facility with federal coal are available for further consideration under this alternative. This alternative offers the least opportunity for coal development. These 13 CSAs are dispersed over much of western North Dakota. The following communities may be impacted depending upon where development occurs: Williston, Tioga, Garrison, Center, Stanton, Beulah, Hazen, Halliday, Killdeer, Dickinson, Belfield, Beach, Bowman, New England, Mott, and Elgin. Each of these communities is located in proximity to one or more CSAs and is large enough that it would attract in-migrants if development were to occur. Some of these communities such as Williston, Dickinson, and Beulah have experienced energy-related development in the recent past.

Direct and indirect employment for the mine and facility would peak at approximately 2500 during construction, and level off to about 1150 during the operations phase (Table 4-1). Peak construction employment of 1400 for this mine and facility represents about 10 percent of the 1984 statewide figure for construction employment. Long-term mining and utilities (facility) employment represent 20 percent and 4 percent, respectively, of 1984 statewide employment figures. In-migration to communities surrounding the development would peak at about 2000 and decline to 1100 in the long term. The project and resulting in-migration could place considerable stress on local services and infrastructure during the construction phase depending upon current community conditions and the size of the incoming population. In the long run, coal severance tax payments would increase 23 percent over 1985 statewide payments, and coal conversion tax payments would increase 31 percent over 1985. These payments could be used to meet some of the increased demand for public services.

The economic impacts of the mine and electric power generation facility on farm and ranch operations, expressed as the dollar value of agricultural production lost, would be \$138,600 annually. This represents 0.5 percent of the average value of the annual agricultural production (in 1982) of

counties containing CSAs and about 0.006 percent of the value of the annual agricultural production for the state. Impacts of strip mining on the operation and management of livestock ranches could be more severe than on dryland farming (USDI 1981). Mine development located near the center of a ranch could seriously interfere with movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution and, in general, disrupt the overall operation. Compensation to the farm/ranch operator would depend upon the type of landowner lease, land ownership pattern, and percentage of land owned versus land leased. The greatest impacts would occur to operators who lease all the land which is removed from production; no compensation would be made for lost leases.

Social impacts include changes in social organization and social well-being, and depend upon the community itself and the number and types of in-migrants. Impacts to social organization (the way in which the people in the community relate to each other) could include: residents no longer knowing everyone else, greater diversity in resident lifestyles, changes in business transactions and government structures from casual to more formalized, increases in the level of outside influences in the community, and erosion of the traditional community power bases. These changes could be permanent, substantial, and intense. Impacts to social well-being could include: the provision of private and public services; increases in stressors such as strangers, noise, crowds, and crime; and increases in income for those who are able to find employment or expand business as a result of the development. Negative impacts to social well-being would be mostly of a short-term nature, noticeable primarily during periods of peak construction (Appendix I).

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character. Some area ranchers and farmers have organized in opposition to development because of their concern

TABLE 4-1  
MINE AND COAL-FIRED ELECTRIC POWER GENERATION PLANT SUMMARY TABLE<sup>1</sup>

	Employment				Payroll to Direct and Indirect Employees (Thousands of Dollars)	In-Migrating Population Associated with Direct and Indirect Employment
	Direct Construction	Direct Operation	Indirect	Total		
1	450	50	300	800	20,500	650
2	1,200	100	750	2,050	52,600	1,700
3	1,400	150	900	2,450	63,000	2,050
4	850	250	800	1,900	47,600	1,600
5	650	350	850	1,850	45,400	1,600
6	600	350	800	1,750	43,100	1,550
7	700	350	900	1,950	47,800	1,700
8	150	450	750	1,350	31,400	1,300
9	0	450	700	1,150	25,900	1,100
10-40	0	450	700	1,150	25,900	1,100

<sup>1</sup>Summary of Tables I-1 through I-5.

# ALTERNATIVE B

## Air Quality

The identification of 597,016 acres as acceptable for assumed coal leasing and possible development of new mines and facilities in 16 CSAs and application of Montana BLM Standard Stipulations on oil and gas leasing on 460,394 acres are the primary factors impacting air quality.

Appendix H illustrates air quality impacts for a typical North Dakota mine and Appendix I illustrates air quality impacts for a mine and end-use facility. The air quality impacts identified in Appendix I show that any further coal development in North Dakota would further utilize the increment for SO<sub>2</sub>, which may be fully consumed under certain meteorological conditions.

Prior to any leasing of federal coal, a detailed site-specific analysis of potential air quality impacts would be conducted. Prior to development of any mine or large-scale end-use facility, NDSHD would require a detailed permit review for mine or end-use facility application.

Continued application of the air quality stipulations included in the Standard Conditions of Approval for all APDs (see Management Guidance Common to all Alternatives) would help minimize the human safety risks of H<sub>2</sub>S, as well as provide necessary gas content information to be used in future air quality studies.

All releases of H<sub>2</sub>S and SO<sub>2</sub> affect the air quality of the local area; primarily through the creation of offensive odors. The impacts to air quality beyond the local area are not yet fully documented. It is evident that there is potential for AAQSS and PSD increments to be exceeded in the Williston Basin. Exceedance of these standards has occurred on a local scale and could occur on a regional scale under present conditions and management practices.

If the increase in wells producing H<sub>2</sub>S in the Williston Basin is not closely monitored, there is a significant potential to exceed AAQSS and PSD increments. These standards will be exceeded not only on a local scale as is presently occurring but also on a regional scale.

Further studies need to be conducted for the oil and gas fields within the district to establish the level of ambient air contamination. Also, studies of cumulative impacts are needed to establish the effects of all the oil and gas fields on the air resource, including effects on the Theodore Roosevelt National Park and Class II areas.

## Minerals

### Coal

The management action significantly affecting the coal resource is the finding of 597,016 acres (10,972 MM tons) as acceptable for further consideration for leasing or exchange and potential leasing and development.

A total of 1,009,648 acres (approximately 17,750 MM tons) of federal coal were identified as having coal development potential. A total of 412,632 acres (6,778 MM tons) were eliminated from areas acceptable for further consideration for leasing or exchange. Following the application of the unsuitability criteria, multiple-use tradeoff, and surface owner consultation screens 597,016 acres of federal coal were found acceptable for further consideration for leasing or exchange (Appendices B through G).

Following the application of the coal screens, 16 CSAs contain sufficient tonnages of federal coal in relatively consolidated patterns to support new mines and, presumably, facilities. The CSAs able to support new mines and facilities with federal coal are:

Antelope  
Arnegard  
Beulah-Zap  
Bowman-Gascoyne  
Center-Stanton  
Dickinson  
Dunn Center  
Elgin-New Leipzig  
Elkhorn  
Golden Valley  
Hanks  
Keene  
Mott  
New England  
Sand Creek  
Williston

The remaining CSAs contain federal coal found acceptable for further consideration in tonnages or patterns which would severely hinder or preclude large scale mine development. These areas would, however, be able to support small scale mining or maintenance of existing mining operations.

All federal coal mined within the area found acceptable for further consideration for leasing or exchange would be irreversibly and irretrievably lost. It is highly unlikely that all of the coal acceptable for further consideration would be mined based on recent downward trends in coal demand, as well as various engineering and permitting restrictions. Also, only portions of the CSAs would be offered for individual lease sales under the leasing process (Appendix A).

Exchange of coal for coal in AVFs and through other exchange processes could remove a significant amount of coal from potential development. Exchanges may result in compensation to the federal government by providing coal lands or resources other than coal.

Land pattern adjustment would have minor impacts to the coal resource if the new surface owner was able to deny consent to mine underlying federal coal. Because there are only 40 acres of public lands included in the areas acceptable for further consideration, the overall impact of land pattern adjustment or any other lands action would be insignificant.

### Oil and Gas

The application of Montana BLM Standard Lease Stipulations to future leases on 460,394 acres of federal oil and gas and the possible disposal of 38,848 acres of public land are the primary change agents affecting oil and gas.

Not restricting oil and gas activities, with respect to time of the year or requiring avoidance of specific areas would allow unhindered exploration and development of oil and gas. Lessees would have more control of their drilling schedule and better able to minimize development costs by taking advantage of drilling opportunities. Protection of leases from drainage by an outside well could be accomplished without being regulated to a specific time of the year.

Exploration and development may increase slightly but would be influenced more by the economic climate, spacing pattern, geological analysis, technological advances and rig availability than by the lack of lease stipulations.



short term impacts. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre, would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment, disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Oil and Gas Lease Stipulations would minimize erosion and compaction impacts to soil resources on up to 460,394 acres by prohibiting activities during muddy and/or wet periods. Erosion control is also called for on slopes of erodible soils over 20 percent.

## Hydrology

The identification of 597,016 acres as acceptable for further consideration and assumed coal leasing and development, identification of zero acres of buried-valley aquifers as high value areas, unrestricted ORV use on 67,520 acres of public lands, identification of 38,536 acres for the protection of Dickinson's municipal watershed, and the application of Montana BLM Standard Stipulations on all future oil and gas leases are the primary change agents affecting hydrology under this alternative. The disposal of up to 38,848 acres of federal surface lands would have only minor impacts to hydrology.

### Coal Study Areas

Under criterion 16, 15,515 acres are considered unsuitable in 19 CSAs. These areas protect losses to downstream occupants and dwellings on flood plains.

Under criterion 19, 32,009 acres are considered unsuitable under a preliminary determination of AVFs.

In addition to those acreages considered under the unsuitability criteria, another 38,536 acres were considered unacceptable for further consideration for coal leasing under the multiple resource tradeoff screen to protect the City of Dickinson's Municipal watershed.

Appendix H describes the probable major impacts of coal mining to the hydrologic resources of the planning area.

### Surface Lands

The disposal of up to about 38,848 acres of scattered tracts under this alternative would have minor impacts on water resources. Disposal to other federal agencies would have no short-term impact but should have positive long-term impacts due to the acquiring agency having greater ability to monitor and manage lands that are physically closer.

Disposal of lands to individuals whose primary interest is not protecting the water resources would have either no impact or minor negative long-term impacts because high-value tracts along major rivers with high watershed values would be retained in compliance with the floodplain management EO. The exchange of scattered tracts to provide for larger contiguous blocks of surface lands in the Big Gumbo and Lost Bridge areas would have long-term positive impacts on the water resources. Lands gained through exchange would consolidate public land and, in some cases, allow BLM to more efficiently manage the watershed to reduce water yields, improve water quality,

and decrease erosion and sedimentation from the watershed. Under the current range management program, sediment and water yields are expected to be reduced by 10 and 5 percent respectively (USDI 1984a).

Unrestricted ORV use in the Big Gumbo area during periods of wet soil conditions may cause increased upland erosion. Compaction of soils would result if ORV use is concentrated on trails during wet periods.

### Other Mineral Estate

All phases of oil and gas operations have the potential to cause significant impacts to local water resources. Oil and gas development increases sediment load through compaction of the soil, reduction of vegetation, building of roads, and other surface disturbing activity. Roads or seismic lines crossing ephemeral, intermittent, or perennial stream channels and wetlands do the most damage. Activity during periods of high soil moisture would cause greater sediment yields than when the soils are dry.

Shallow water wells and springs may be impacted by the detonation of explosives or other methods of seismic exploration. Aquifers composed of brittle material may shatter when explosions occur in the immediate area. This may decrease the water quality of the aquifer because shattering of the aquifer exposes many new surfaces for dissolution of material. A shock wave could cause a formation to fracture and cause movement of ground water to or from the aquifer. In some cases flows from shallow water wells may be affected by this fracturing. In addition, plugging of shot holes is not always successful thus allowing for cross-contamination of aquifers or contamination by surface inflow.

After abandoning the site, disturbed areas are regraded and revegetated; sediment production would decline and return approximately to initial levels. During the lifetime of oil and gas development in an area (20-30 years), some water consumption occurs as well as some degradation of water quality. In the long term, following reclamation, water consumption would stop and water quality would return to predevelopment levels.

Continued application of Montana Standard Stipulations for oil and gas leases would minimize negative impacts to water resources by providing for erosion control (activities may be prohibited during muddy and/or wet periods), and provide for a buffer from reservoirs, lakes, ponds, streams, or rivers, and on slopes of erodible soils over 20 percent.

## Vegetation

The management action significantly affecting vegetation is the finding as acceptable and assumed leasing and development of up to 597,016 acres of federal coal. Management actions causing less significant impact to vegetation are: land disposal of up to 38,848 acres, continuation of the present range management program, unrestricted ORV use on all public lands, and application of Montana BLM Standard Stipulations on all future oil and gas leases.

### Coal Study Areas

The acres found acceptable for coal leasing and development consist largely of farmland (about 384,000 acres) used for growing crops such as wheat, sunflowers, and alfalfa. Native vegetation remaining would primarily consist of native prairie (about 136,000 acres) on gentle to moderate slopes used for livestock grazing and wooded draws (about 29,000 acres).

Habitats identified under multiple-use tradeoffs would be allowed to go forward for coal leasing under the threshold concept. Up to 48,522 acres or 53.8 percent of the area in this category could be leased. However, each CSA has an individual threshold percentage that was determined from the particular values of the CSA. Once the threshold percentage is reached, no further leasing would occur without a joint review of the situation in the individual CSA by BLM, NDGFD, and USFWS. The intent of the threshold approach is to minimize long-term adverse impacts by protecting a portion of the remaining higher value habitats without having to arbitrarily specify precise geographic areas.

A total of 597,016 acres remains suitable for leasing and subsequent mining of coal. Included in this acreage are 151,577 acres acceptable with stipulations (Appendix F). Assuming a moderate pace of development and realizing that only a small portion of the lands in a mine area are actually disturbed at any time (Appendix H) short- and long-term impacts on wildlife would be significant but local.

Suitable acreages in the CSAs are comprised mainly of agricultural lands and some native prairie of lower quality. Agricultural lands can be reclaimed effectively. The productivity of native prairie may be reclaimed in the short term; however, the natural diversity of native prairie may only be achieved in the long term (Appendix H). Woody draws may never be reclaimed to their original character and all reclamation would extend into the long term. Thus, the most significant long-term impacts would occur to species occupying the 29,387 acres of woody draws that could conceivably be mined under this alternative.

#### **Surface Lands**

Impacts to wildlife resulting from the disposal of up to 38,848 acres of scattered surface tracts would depend on who acquires the land. Disposal to other federal agencies would have no short-term impacts but should have positive long-term impacts. This would result from the acquiring agency being better able to monitor and manage lands to which they are physically closer. Disposal of lands to individuals or organizations who are primarily interested in wildlife management would similarly have positive long-term impacts on wildlife.

Disposal to individuals or organizations whose primary interest is not in managing wildlife would have either no impact or negative long-term impacts. Once the habitat is disposed of, the habitat could be plowed, logged, burned, over-grazed, or otherwise degraded. The future opportunity to enhance these habitats is also foregone. For example, as long as these lands are in federal ownership, it would be possible to construct wetlands, plant trees, fence, or do other project work at some future time. Disposal also would forego the opportunity to carry out future land exchanges more beneficial to wildlife.

Under this alternative, it is important to note that BLM would be initiating disposal actions. If public interest is high, it could result in a large number of disposals under consideration at one time. Whereas all legally-mandated clearances would be carried out; e.g., threatened and endangered species clearances, it may not be possible to fully evaluate tracts for the presence of other species (State-proposed threatened and endangered, migratory birds of high federal interest, and State high priority species).

The exchange of scattered tracts to provide larger contiguous blocks of surface lands in the Big Gumbo and Lost

Bridge areas would generally have positive long-term impacts on wildlife. The consolidation of lands in these areas would make management more efficient and allow greater opportunities for enhancing their habitats. In the Big Gumbo area, benefitting species would be pronghorn, sage grouse, raptors, and other species of high interest such as the long-billed curlew. In the Lost Bridge area, key species are elk, raptors and, possibly in future years, bighorn sheep.

Unrestricted ORV use may have significant local impacts on fragile wetland, riparian, and woody draw habitats by initiating or accelerating vegetative loss and soil erosion. Direct loss of terrestrial habitat and loss of quality in aquatic habitats due to sedimentation may reduce local wildlife and fishery populations.

Disturbance and harassment of elk and bighorn sheep on winter and calving/lambing habitats may directly reduce population numbers. The creation of new roads and trails by repeated use also makes more areas accessible to hunters and others who otherwise would not be able or inclined to drive into particular areas. This increases general disturbance of wildlife as well as the potential for poaching.

#### **Other Mineral Estate**

Continued application of Montana Standard Stipulations for oil and gas development on 460,394 acres may result in long-term negative impacts to golden eagles, prairie falcons, ferruginous hawks, prairie dogs, sage grouse, elk, bighorn sheep, wetlands, and riparian habitat. Current stipulations for wildlife and habitat resources are not specific enough to adequately protect priority species and habitats. The lessees are not advised in sufficient detail of possible seasonal or spatial restrictions at the time of leasing. Conflicts may then occur at APD time that otherwise could have been avoided.

### **Agriculture**

The finding of 597,016 acres of federal coal acceptable and the assumed leasing and development, the disposal of up to 38,848 acres, and the continuation of present grazing management would have only minor impacts on the region's agricultural production.

#### **Coal Study Areas**

There would be a short-term loss to crop production and livestock grazing. Crop production is the leading commodity impacted because cropland in the major land type left (about 384,000 acres) after the application of the four coal screens. However, reclaimed cropland has the best chance of succeeding and meeting regulatory requirements.

At the height of a mining operation, normally slightly over 36 percent of a typical mine permit area would be in some phase of mining or reclamation (Appendix H). Some crop production and grazing would occur during the latter part of the reclamation process. The degree of impact to an individual farmer would depend on how much of his operation falls within the active mine area.

There would not be a significant loss of grazing land. About 165,000 acres remain acceptable for further consideration. Reclamation of pasture lands has generally proved successful. Significant increases in total production are often possible but accompanied by a long-term loss of plant species diversity.



dispersed recreation opportunities. This impact may be offset by additional road development, which would enhance access to recreational areas. Continued oil and gas development would also increase hunting pressure on areas adjacent to development. The overall impacts on recreational resources under these stipulations would be minimal.

Oil and gas development under current lease stipulations would have an effect on visual resources. If there is a new development, the intrusion of oil and gas facilities would have a greater impact. Mitigation of the impact would be accomplished by requiring the maintenance of the visual qualities of the landscape and ensuring that facilities have proper design, painting and camouflage, to blend in with the natural surroundings.

## Cultural Resources

The finding of 597,016 acres acceptable for further consideration and the assumed coal leasing and development, application of Montana BLM Standard Stipulations for future oil and gas leases, disposal of up to 38,848 acres of public lands, and the designation of all surface lands as open for ORV use, would be the major management actions affecting cultural resources.

### Coal Study Areas

Under multiple-use tradeoff 3,961 acres of federal coal were dropped from further consideration for coal leasing due to the regional or national significance of the cultural resources. Included is all federal coal within the eligible Knife River Flint Historic District, Writing Rock State Historic Site, and the A.C. Townley farmstead.

Inventory data is not uniform for all CSAs. As a result, the exact number of sites within these areas is unknown. Data adequacy problems will be improved at the completion of an ongoing Class II cultural resource survey of five CSAs. Extrapolation of existing inventory data to all CSAs indicates that under this alternative 239-1194 sites would be significant and would be indirectly or directly impacted by the leasing and subsequent mining of coal.

Cultural resources determined eligible through consultation will be avoided or mitigated through documentation (historic Euro-American sites) or a data recovery program (archaeological sites). Standard data recovery methods, in most cases, would be adequate to minimize direct adverse impacts from coal leasing and subsequent mining (see discussion in Alternative A).

### Surface Lands

Based on the extrapolation of existing data, the disposal of up to 38,848 acres would potentially affect 311 cultural resources. Between 5 and 25 percent (16-78) of these sites would be significant.

Cultural resources determined eligible would require mitigation prior to disposal (see discussion in Alternative A). Overall impacts to cultural resources would be minimal if proper mitigation measures are observed.

Unrestricted ORV use of public lands would minimally impact cultural resources, assuming current levels of ORV use. At the present levels of ORV use some impacts may occur due to vehicle damage to surface cultural resources and collection of artifacts.

## Other Mineral Estate

Cultural resources would continue to be provided protection by standard oil and gas lease stipulations. Oil and gas development would possibly affect an estimated 200-1000 eligible cultural resources (see discussion in Alternative A).

The preferred method of reducing the level of impact on cultural resources is avoidance through relocation of project development. If it is not possible to relocate the project the adverse effects from development would be mitigated by extensive documentation/recordation or through a data recovery program. Overall impacts to cultural resources on 460,394 of federal oil and gas estate, following proper mitigation measures, would be minimal.

## Paleontology

Major management actions affecting paleontological resources include the finding of up to 597,016 acres acceptable for further consideration and assumed coal leasing and development, disposal of up to 38,848 acres of public lands, unrestricted ORV use of public lands, and continued application of Montana BLM Standard Oil and Gas Lease Stipulations to future oil and gas leases.

### Coal Study Areas

Paleontological investigations have not been systematically conducted for any of the CSAs. Thirty-three fossil locations have been recorded within the CSAs. Four of these sites are considered rare. Of the 33 recorded sites only 11 are located over federal coal and one contains rare fossils.

Direct impacts to paleontological resources would presumably be mitigated by salvage. Residual impacts following mitigation are not anticipated.

### Surface Lands

Paleontological resources have not been recorded on tracts identified for disposal; however, if significant fossils are discovered, their disposition would be on a case-by-case basis. Alternatives include retention of federal land or salvage of fossil resources. Due to excessive costs, salvage is unlikely unless time and expertise is donated. The risk of impacts to paleontological resources are slight provided mitigation occurs prior to disposal.

Unrestricted ORV use would not have a significant impact on paleontological resources, provided the level of ORV use does not increase. Some impacts may occur due to fossil prospecting.

## Other Mineral Estate

Montana BLM Standard Stipulations provide for the protection of paleontological resources. The standard stipulations, however, do not specifically require the identification of these resources prior to a lease. The potential exists for impacts to occur to significant paleontological resources under Montana BLM Standard Stipulations. Once these resources are discovered and reported; however, the disposition of the resources would be on a case-by-case basis. Fossil sites of significant scientific interest would be protected or salvaged at the discretion of the BLM. Impacts to paleontological resources under continued application of Montana BLM Standard Stipulation would be slight.

is being picked up in exchanges (federal, state, or fee), and (5) the new jurisdiction of disposed land and the kind of tax payments that will be made in the future on that land.

Examination of six sales and exchanges that occurred in North Dakota in the past few years indicates small losses in tax revenues occurred in affected counties because per acre real estate property tax was generally slightly less than PILT. However, in all North Dakota counties but Bowman, less than 0.5 of 1 percent of the county total is BLM surface that would be available for disposal. Changes in county revenue due to changes in PILT are expected to be insignificant. The economic impacts of specific proposals will be assessed at the activity plan level in the Land Report and EA.

Designating all lands open to ORV travel would not change present management and would have little or no impact on the local economy.

Oil and gas development would continue to occur as it has in the past. Exploration would provide jobs for the local

economy. The extent of other employment in the oil and gas industry in the area will depend upon discovery of any deposits, the size of such deposits, and their development potential.

This alternative would not change the general attitudes or values presently held by the residents of the study area, but it could affect attitudes toward and expectations of BLM. Individuals and groups that favor resource development may approve of the large amount of coal acceptable for further consideration, the disposal of lands that are difficult to manage, the designation of all lands as open to ORV use, and the usage of Montana Standard Stipulations rather than special stipulations for oil and gas development. Other groups and individuals who are concerned with environmental protection may feel the adoption of this alternative would mean in the future the BLM would inadequately protect some of its resources such as wetlands, wildlife, and air quality.

#### ALTERNATIVE B SUMMARY OF COAL SCREENS

CSA	Acres Federal Coal	Unsuit.	ACRES EXCLUDED		Wildlife Threshold <sup>1</sup>	Acres Acceptable
			Multiple Use	Surface Owner		
ANTELOPE	32360	910	2014	0	1354	29436
ARNEGARD	25020	105	1774	10561	859	12580
BEULAH-ZAP	57200	10274	1556	1779	1485	43591
BOWMAN-GASCOYNE	21320	231	1395	0	868	19694
CENTER-STANTON	27480	1197	1640	1120	1054	23523
DICKINSON	108628	6842	40263	9050	199	52473
DIVIDE	3760	461	0	480	0	2819
DUNN CENTER	88560	5196	5286	15115	639	62963
ELGIN-NEW LEIPZIG	14400	325	92	240	92	13743
ELKHORN	25380	267	2512	4070	2512	18531
FORTUNA	19400	8539	1875	1676	56	7301
GARRISON	12660	4067	5623	627	0	2343
GOLDEN VALLEY	21960	850	1021	2478	0	17611
HANKS	47100	2917	2188	3084	1901	38911
KEENE	122700	14600	45496	16304	3148	46300
MOTT	42200	806	279	0	279	41115
NEW ENGLAND	95800	5569	277	11889	162	78065
NIOBE	160	0	0	0	0	160
SAND CREEK	57240	1761	5742	7906	616	41831
TOBACCO GARDEN	64060	50385	0	3884	0	9791
UNDERWOOD	2600	995	0	0	0	1605
VELVA	20280	16122	1525	0	0	2633
WASHBURN	1360	85	86	0	86	1189
WILLISTON	98020	60878	8189	154	217	28799
TOTAL	1009648	193382	128833	90417	15527	597016

<sup>1</sup>Wildlife threshold acreages are included in multiple use.

Including NSO stipulations in leases would affect the overall development of oil and gas fields by precluding the strategic placement of wells in some spacing windows. This impact would be slight due to the scattered pattern of the federal reserves and predominance of private oil and gas. NSO stipulations would require more complete geologic information than if convention drilling methods were used, thus causing increased expense.

Limiting oil and gas exploration activities to specified times of the year on up to 206,117 acres would have a short-term adverse impact. These stipulations could upset the drilling schedules of lessees. There is a possibility of reserves being drained by a well outside of the lease being brought into production while drilling inside the lease was delayed. This would cause a temporary loss of royalties to the federal government. Stipulations limiting exploration activities to specific times of the year would increase the need for long range planning. Use of this type of stipulations could cause drilling to take place during the winter causing increased construction and drilling costs. There would be no long-term impacts on oil and gas field development due to seasonal restrictions.

Exploration and development could drop slightly from the present rate under this alternative, but would be influenced more by the economic climate, spacing pattern, geological analysis, technological advance and rig availability than application of lease stipulations.

### Other Minerals

The identification of 571,388 acres as acceptable for further consideration and assumed coal leasing and development and the possible disposal of up to 22,819 acres and exchange only of up to 11,844 acres of public land are the primary change agents affecting salable, leasable (other than oil and gas and coal) and locatable minerals.

An undetermined amount of scoria would be buried or displaced during surface mining. The disturbance would essentially eliminate the potential for future development of the scoria.

The creation of split estate situations, by land exchanges and other disposals, would cause slight adverse impacts to the mineral material resource. Although the availability would not be affected, development would require agreements with both private and federal parties resulting in greater processing time and expense.

Disposal of the surface estate would prevent unclaimed locatable minerals from being claimed and recorded, pending regulations. The resulting impact would not affect the federal government because no royalties are received from locatable minerals. Impacts would occur to private mining parties who lose access to potential mineral resources. Little development of federal locatable minerals has occurred in North Dakota.

### Soils

Management actions significantly affecting the soil resource include: the finding as acceptable and assumed leasing and development of up to 571,388 acres of federal coal and identification of 79,478 acres of steep slopes (over 30 percent) to be eliminated from further consideration of leasing. Management actions causing less significant impact to soils are: land disposal or exchange of up to 22,819 acres and exchange only of up to 11,844 acres, the continuation of the present range management program,

seasonally restricting ORV use on 22,164 acres in the Big Gumbo area, and applying Montana BLM Standard Stipulations and additional wetland and riparian area special stipulations, where necessary, for all new oil and gas leases.

### Coal Study Areas

Reclamation potential of the CSAs is generally low on about 244,987 acres of surface land over federal coal that are in LCCs VII and VIII because of topography, shallow depth to bedrock, rock outcrops, and steepness of slopes. The 79,478 acres of steep slopes noted above are included in these two LCCs, and since eliminated from further consideration for leasing, there would not be any significant short- or long-term impacts to soils on them. About 73 percent of the 79,478 of steep slopes are found in the Tobacco Garden and Williston CSAs.

The balance of class VII and VIII land over federal coal (165,509 acres) has slopes of 15-30 percent. Much of this acreage has been eliminated from further consideration for leasing by the other coal screens. However, a small amount would be included in the federal coal found acceptable for leasing. The NDPSC would likely allow surface mining on only the less rugged areas in this slope category. Problems with initially removing soil material, erosion, and returning approximate original contours would increase as steeper slopes are encountered.

The impacts to the soil from mine development (Appendix H) would cause a short-term loss in soil productivity. However, the proper recontouring of overburden and replacement of topsoil and subsoil as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would return productivity to acceptable levels in a relatively short time (Appendix H, Table H-1). No major long-term impacts to the soil would be anticipated.

### Surface Lands

The disposal or exchange of lands would not impact the soil resource, in most cases, assuming no change of use. Soils on tracts transferred to other federal agencies basically would remain the same or even improve slightly in the long term if they are better able to manage the land.

Obtaining larger parcels near Big Gumbo and Lost Bridge through pooling would mean giving up scattered BLM tracts for privately-owned surface. BLM lands exchanged during pooling would pass into private ownership. The soil might then be abused by overgrazing or a change in land use. The type of change made; e.g., agriculture and road or building construction, would determine the amount of erosion. Major changes in land use are unlikely, therefore, soil loss is expected to be insignificant in the short and long term.

Big Gumbo, Lost Bridge and scattered lands with high wildlife, watershed, and recreation values would be retained. Lands gained in their vicinity through pooling would possibly receive short- and long-term positive impacts to the soil. With larger blocks of public land, BLM could more efficiently manage the watershed to decrease erosion and compaction.

Grazing under the present range management program would have positive impacts to soils in the long term. Soil conditions would improve slightly because an increase in vegetative cover through mechanical or grazing treatments would result in increased soil moisture, less runoff, and subsequently less erosion.

Continued application of Montana Standard Oil and Gas Lease Stipulations would minimize negative impacts to water resources by providing for erosion control (activities may be prohibited during muddy and/or wet periods), and provide for a buffer from reservoirs, lakes, ponds, streams, or rivers, and on slopes of erodible soils over 20 percent.

## Vegetation

The management action significantly affecting vegetation is the finding as acceptable and assumed leasing and development of up to 571,388 acres of federal coal. Management actions causing less significant impact to vegetation are: land exchange or disposal on up to 22,819 acres and exchange only of up to 11,844 acres, continuation of the current range management program, seasonally restricting ORV use on 22,164 acres in the Big Gumbo area, and applying Montana BLM Standard Stipulations and additional wetland and riparian area stipulations, where necessary, for all new oil and gas leases.

### Coal Study Areas

The areas found acceptable for coal leasing consist largely of farmland (about 381,000 acres) used for growing crops such as wheat, sunflowers, and alfalfa. Native vegetation remaining in this acreage primarily consists of native prairie (about 146,000 acres) on rather gentle slopes used for livestock grazing and wooded draws (about 17,000 acres). Mining would cause significant short- and long-term losses in vegetative productivity depending on the vegetation disturbed (Appendix H). The proper recontouring of overburden, replacement of soil material and revegetation as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would normally return productivity to acceptable levels in a relatively short number of years. (Appendix H, Table H-1.)

### Surface Lands

Disposal or exchange of up to 22,819 acres and exchange only of up to 11,844 acres of public lands would have only minor impacts on vegetation. Vegetation on tracts of land transferred to other federal agencies would remain the same as possible. Most tracts would continue to be used for grazing and/or wildlife purposes.

If larger parcels are obtained near Big Gumbo and Lost Bridge through pooling, management would normally dictate that they be returned to rangeland/pasture, if not currently in such a state. The vegetation would be used to graze livestock and wildlife, provide habitat, and control erosion. This would be a long-term positive impact.

High resource value areas retained in public ownership would see little impacts to vegetation or slight improvements. A continuation of the present range management program would have positive impacts on vegetation. Total vegetation production would increase about 6.5 percent in the long term. Management actions that would enhance vegetative growth, such as contour furrowing, change in livestock use, etc., would be carried out if necessary.

By emphasizing trespass abatement, the small areas of public land being farmed would be returned to rangeland/pasture. The permanent cover returned would provide forage, habitat, and erosion protection.

ORV restrictions would adequately protect vegetation on the area of public lands most likely to receive significant ORV use. Most areas disturbed by ORVs would recover within two to three years under light use. Small areas

receiving repeated use would remain unvegetated in the long term. These trails would be closed if excess erosion and vegetative loss is identified.

### Other Mineral Estate

Oil and gas exploration normally disturbs small areas of vegetation along a seismic line and drilling site. Assuming proper cleanup and handling of soil, these areas would be revegetated within one to two years. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short-term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment, disturbed areas would be regraded, soil material replaced and revegetated.

Loss and disturbance of vegetation due to oil and gas activity would be kept minimal on up to 460,394 acres by applying the Montana BLM Standard Stipulations to all new leases. Special stipulations identified in Appendix N would protect vegetation in or adjacent to wetlands and riparian areas.

## Wildlife

The finding as acceptable and assumed leasing and development of up to 571,388 acres of federal coal, including 16,771 acres of woody draws, would have substantial short- and long-term impacts on a variety of high priority wildlife species and their habitats. The exchange or disposal of up to 22,819 acres and exchange only of up to 11,844 acres of public lands would have beneficial short- and long-term impacts. The application of special stipulations on oil and gas leases on 206,117 acres, and limited ORV use on 22,164 acres of public lands would have only minor short- and long-term impacts in high priority species and their habitats.

### Coal Study Areas

No federally-listed threatened and endangered species would be affected by this alternative. The bald eagle, peregrine falcon, and whooping crane migrate through the area, but their use of the planning area is erratic. No interior least terns, black-footed ferrets, or piping plovers are known to breed in the CSAs. However, they may occur on BLM surface tracts. (See below.)

No habitats were considered unsuitable under criteria 9, 10, and 12. Under unsuitability criteria 11, 13, 14, and 15, 148,045 acres of wildlife habitat are considered unsuitable for further consideration for coal leasing (Appendix C). In addition, another 12,809 acres are considered unsuitable under criterion 1, as it applies to wetlands under management for waterfowl production by the USFWS. Thus, the total acreage unsuitable due to wildlife values is 160,854 acres. A more detailed explanation of the habitats protected under criteria 11, 13, 14, and 15 follows.

Under criterion 11, 16,239 acres (Appendix C) are considered unsuitable due to golden eagle nest sites and buffer zones. These occur in five CSAs. Buffer zones include the nest site (typically a badlands cliff area) woody draws, native prairie, and, in some cases, agricultural lands.

Under criterion 13, 98 acres in the Keene CSA are considered unsuitable due to the buffer zone around a prairie falcon nest site.

or roads that permanently lower the quality of habitat because of traffic disturbance and increased access by poachers. The ability to close problem areas will help protect critical seasonal use habitats for pronghorn, sage grouse, and raptors that may be identified in the future.

## **Agriculture**

The finding of 571,388 acres acceptable for further consideration and the assumed coal leasing and development, the identification of 22,819 acres of public lands for exchange or disposal and exchange only of up to 11,844 acres, and the continuation of present grazing management would have only minor impacts on the region's agricultural production.

### **Coal Study Areas**

At the height of mining operations, over 36 percent of a typical mine permit area would be in some phase of mining or reclamation (Appendix H). Some production would occur during reclamation. The degree of impact to an individual farmer would depend on how much of his operation falls within the active mine area.

Within the CSAs, short-term loss of crop production would be the greatest impact to agriculture. This results because after the coal screening process is completed, cropland is the major land use remaining (about 381,000 acres). Reclaimed cropland has the best chance of succeeding and meeting regulatory requirements.

There would not be a significant loss of grazing land. Much of the grazing land was excluded under the multiple-use tradeoff screens for slopes and wildlife habitat. Reclamation of pasture lands has generally proved successful. Significant increases in total production are often possible but accompanied by a long-term loss of plant species diversity.

### **Surface Lands**

Blocking up of scattered tracts into more manageable units would benefit grazing management and add efficiency to grazing lease administration. Upon the acquisition of sizable blocks of land, detailed AMPs that would benefit long-term forage production and livestock use would be developed. Grazing management would be concentrated on the Lost Bridge and Big Gumbo areas.

Land disposal could have both positive and negative impacts on grazing lessees. Historically, BLM lease rental rates have been much lower than private and state leases. Land ownership gives the owner total control on how the land is used. Land pattern adjustment could result in part or all of a permittee's leased forage being transferred to a different manager or owner. This would disrupt, presumably over the short term, the livestock operation.

### **Other Mineral Estate**

There would be no significant long-term impacts to agriculture.

## **Lands and Realty**

There would be no significant impacts on the land resources resulting from assumed coal leasing, developing oil and gas leases or disposing of mineral materials. There would be a long-term opportunity for repositioning land ownership on up to 34,663 acres (including exchange only areas) which is 5 percent of the public land in the state. There would be an improved ownership pattern, reduced man-

agement difficulties and an overall increase in public values. A total of 44,701 acres of public lands would be retained.

### **Surface Lands**

In the Big Gumbo consolidation area (Map 2-1) 28,490 acres would be retained. Of this acreage, 4,427 acres would be available for repositioning via exchanges (one-to-one or exchange pooling) within the same area or within the Lost Bridge consolidation area. Those lands not exchanged would be retained. There would be no land disposals via sale within the consolidation area. It is anticipated at least 2000 acres of private land would be acquired by the federal government based on past exchange ratios of public to private land (1.4:1 to 1.75:1).

Disposal of significant acreages by R & PP patent, Color-of-Title Act patent or withdrawal is not anticipated. No land would be added to the public land base by withdrawal revocations in the Big Gumbo area.

In the Lost Bridge consolidation area (Map 2-2) 14,806 acres would be retained. Of this acreage, 7,417 acres would be available for repositioning via exchanges (one-to-one or exchange pooling) within the Lost Bridge consolidation area or within the Big Gumbo consolidation area. Lands not exchanged would be retained. There would be no land disposals via sale.

Disposals of significant acreages by R & PP patent, Color-of-Title patent or withdrawals is not anticipated. A small undetermined acreage would be added to the public land base by withdrawal revocations in the Lost Bridge area.

Of the remaining public lands in the state, up to 22,819 acres would be available for exchange, exchange pooling, sale, R & PP patent, or transfer to other agencies.

Over the next 15 years, it is estimated 40 percent of these lands would leave public ownership. Most of the lands not transferred to another agency or addressed in a Disclaimer of Interest would be utilized in exchanges. These would balance the impacts of the disposal with those of acquisition and would result in a net increase in public values. The long-term result would be an improved ownership pattern, reduced management difficulties and an overall increase in public values.

An unknown acreage of withdrawn land would be returned to BLM administration. The withdrawals would be assessed on a case-by-case basis to determine their final disposition.

Land classifications would be removed from all lands now classified, approximately 8,000 acres. This would increase the public land acreage under multiple-use management.

### **Other Mineral Estate**

There would be no impacts on the land resources from exploring and developing oil and gas leases or permitting disposals of mineral materials.

## **Recreation and Visual Resources**

The finding of 571,388 acres acceptable for further consideration and assumed coal leasing and development, the exchange or disposal of up to 22,819 acres of public lands and exchange only of up to 11,844 acres, the application of Montana BLM Standard Oil and Gas Lease Stipulations and additional special stipulations, and the seasonal limitation on ORV use of 22,164 acres would have only minor impacts on recreation and visual resources.

## Surface Lands

This alternative identifies 22,819 acres for exchange or disposal and 11,844 acres for exchange only. It is estimated the disposal would affect 183 cultural resources of which approximately 5 percent to 25 percent (9-46) would be significant. Exchange of lands within the Big Gumbo and Lost Bridge consolidation areas could affect an additional 95 sites but may result in the acquisition of similar cultural resources.

Cultural resource determined eligible would require mitigation prior to disposal (see discussion in Alternative A). Overall impacts to cultural resources would be minimal following proper mitigation.

Impacts to cultural resources from ORV use even in areas designated as "open" are not anticipated to be high given the current level of use. Some impacts may occur due to vehicle damage to surface cultural resources and collection of artifacts.

## Other Mineral Estate

Cultural resources would continue to be provided protection by application of MSO standard lease stipulations and additional special stipulations for oil and gas. Oil and gas development would affect an estimated 200-1000 significant cultural resources.

Some decrease in the number of acres available for development may occur in this alternative due to NSO or seasonal restrictions for wildlife and wetlands. These stipulations could possibly reduce the total area available within a given lease thereby limiting the number of alternate project locations. This may tend to limit opportunities to avoid impacts to cultural resource resulting in the selection of a more destructive form of mitigation. Conversely, wetland and wildlife restrictions may have a beneficial effect on cultural resources by eliminating areas with high cultural resource values. Overall impacts to cultural resources resulting from oil and gas development would be slight.

## Paleontology

Major management actions affecting paleontological resource include the finding of 571,388 acres acceptable for further consideration and assumed coal leasing and development, disposal or exchange of up to 22,819 acres and exchange only of 11,844 acres of public lands, seasonal limitations of ORV use on 22,164 acres of public lands and continued application of Montana BLM Standard Stipulations and additional special stipulations to future oil and gas leases.

## Coal Study Areas

Paleontological investigations have not been systematically conducted for any of the CSAs. Thirty-three fossil locations have been recorded within the CSAs. Four of these sites are considered rare. Of the 33 recorded sites only 11 are located over federal coal, and one contains rare fossils.

Direct impacts to paleontological resources would be minimal. Paleontological resources of significant scientific interest would be protected or salvaged. Residual impacts following mitigation are not anticipated.

## Surface Lands

Paleontological resources have not been identified on tracts identified for exchange or disposal; however, some

parcels are located within the Hell Creek Formation which has produced significant fossil discoveries. Parcels which contain fossils of significant scientific interest would be retained in federal ownership or the effect of disposal on significant fossil resources would be mitigated by salvage.

Salvage is unlikely, due to excessive costs, unless time and expertise is donated. Overall, the disposal of public land would not have a significant impact on paleontological resources.

Impacts to paleontological resources from ORV use would be minimal provided mitigation is employed. Some impacts may occur due to fossil prospecting.

## Other Mineral Estate

Montana BLM Standard Oil and Gas Lease Stipulations provide for the protection of paleontological resources. The standard stipulations, however, do not specifically require the identification of these resources prior to operations on a lease. The potential exists for impacts to occur to significant paleontological resources under Montana BLM Standard Stipulations. Once these resources are discovered and reported, however, the disposition of the resources would be on a case-by-case basis. Overall impacts to paleontological resources would be slight.

## Economic and Social Condition

The finding of 571,388 acres as acceptable for further consideration and assumed coal leasing and development, the disposal or exchange of up to 22,819 acres and exchange only of 11,844 acres, the application of special oil and gas lease stipulations on 206,117 acres in addition to the application of standard stipulations to all future leases, and the designation of 22,164 acres as limited use areas for off-road travel result in significant social and economic impacts.

## Impacts of Coal Mining and Related End-Use Facilities

A detailed analysis of possible coal development is presented in Appendix I. The impacts resulting from the development of a mine and related facility are summarized below.

Fifteen CSAs capable of supporting at least one mine and facility with federal coal are available for further consideration under this alternative. These 15 CSAs are dispersed over much of western North Dakota. The following communities may be impacted depending upon where development occurs: Williston, Tioga, Watford City, Center, Stanton, Beulah, Hazen, Halliday, Killdeer, Dickinson, Belfield, Beach, Bowman, New England, Mott, and Elgin. Each of these communities is located in proximity to one or more CSAs and is large enough that it would attract in-migrants. Some of these communities such as Williston, Dickinson, and Beulah have experienced energy-resource-related development in the recent past.

Direct and indirect employment for the mine and facility would peak at approximately 2500 during construction, and level off to about 1150 during the operations phase (Table 4-1). Peak construction employment of 1400 for this mine and facility represents about 10 percent of the 1984 statewide figure for construction employment. Long-term mining and utilities (facility) employment represent 20 percent and 4 percent, respectively, of 1984 statewide employment figures. In-migration to communities surrounding the development would peak at about 2000 and decline to 1100 in the long term. The project and resulting

**ALTERNATIVE C  
SUMMARY OF COAL SCREENS**

CSA	Acres Federal Coal	Unsuit.	ACRES EXCLUDED		Wildlife Threshold <sup>1</sup>	Acres Acceptable
			Multiple Use	Surface Owner		
ANTELOPE	32360	910	3436	0	1082	28014
ARNEGARD	25020	105	3108	10517	2147	11290
BEULAH-ZAP	57200	10274	4013	1779	1627	41134
BOWMAN-GASCOYNE	21320	231	1828	0	1301	19261
CENTER-STANTON	27480	1197	2457	1120	1316	22706
DICKINSON	108628	6842	42877	8882	290	50027
DIVIDE	3760	461	0	480	0	2819
DUNN CENTER	88560	5196	6859	15115	382	61390
ELGIN-NEW LEIPZIG	14400	325	399	240	219	13436
ELKHORN	25380	267	4185	3911	2442	17017
FORTUNA	19400	8539	2028	1636	169	7197
GARRISON	12660	4067	5623	627	0	2343
GOLDEN VALLEY	21960	850	852	2478	0	17780
HANKS	47100	2917	6663	2755	3947	34765
KEENE	122700	14600	49462	16085	5618	42553
MOTT	42200	806	1591	0	1300	39803
NEW ENGLAND	95800	5569	1266	11770	196	77195
NIOBE	160	0	0	0	0	160
SAND CREEK	57240	1761	8406	7298	2328	39775
TOBACCO GARDEN	64060	50385	283	3796	0	9596
UNDERWOOD	2600	995	0	0	0	1605
VELVA	20280	16122	1596	0	0	2562
WASHBURN	1360	85	273	0	130	1002
WILLISTON	98020	60878	9030	154	811	27958
TOTAL	1009648	193382	156235	88643	25305	571388

<sup>1</sup>Wildlife threshold acreages are included in multiple use.



would require more complete geologic information than if conventional drilling methods were used, thus causing increased expense.

Limiting oil and gas exploration activities to specified times of the year on up to 106,620 acres would have a short-term adverse impact. These stipulations could upset the drilling schedules of lessees. There is a possibility of reserves being drained by a well outside the area, addressed by the stipulations, being brought into production while drilling inside the areas was delayed. This would cause a temporary loss of royalties to the federal government. Stipulations limiting exploration activities to specific times of the year would increase the need for long range planning. Use of this type of stipulations could cause drilling to take place during the winter causing increased construction and drilling costs. There would be no long-term impacts on oil and gas field development due to seasonal restrictions.

A "No Leasing" designation on 99,497 acres of oil and gas reserves could cause a loss of an undetermined amount of royalties to the federal government. It would remove potential oil and gas reserves from leasing. This would be a long term, irreversible impact. The federal oil and gas reserves could not be developed, even from outside the "No Leasing" areas. Oil and gas resources might then be drained from wells on adjacent state or privately owned mineral; resulting in an irretrievable adverse impact.

Exploration and development could drop slightly from the present rate under this alternative, but would be influenced more by the economic climate, spacing pattern, geological analysis, technological advance and rig availability than application of lease stipulations.

#### **Other Minerals**

The identification of 484,592 acres as acceptable for further consideration and assumed coal leasing and development is the primary change agents affecting salable, leasable (other than oil and gas and coal) and locatable minerals.

An undetermined amount of scoria would be buried or displaced during surface mining. This disturbance would essentially eliminate the potential for future development of the scoria.

#### **Soils**

The management action significantly affecting the soil resource is the finding as acceptable for further consideration and assumed leasing and development of 484,592 acres of federal coal. Management actions causing less significant impact to soils are: grazing under the current range management program, limitations of ORV use of 22,164 acres in the Big Gumbo area, and applying Montana BLM Standard Stipulations and other special oil and gas stipulations to all future leases.

#### **Coal Study Areas**

By eliminating from further consideration 244,987 acres with slopes greater than 15 percent, almost all the soil in LCCs VII and VIII over federal coal would not be disturbed for mining. Therefore, negative short-and long-term impacts to the soil from surface mining these acres would be avoided. The Williston CSA would have 68 percent, Tobacco Garden CSA, 59 percent and Beulah-Zap CSA, 43 percent of the federal coal acreage eliminated from further consideration for leasing under this alternative due to slopes greater than 15 percent.

The impacts to the soil from mine development (Appendix H) would cause a short-term loss in soil productivity. However, the proper recontouring of overburden and replacement of topsoil and subsoil as required by North Dakota Rules Governing the Reclamation of Surface-Mined Land (NDPSC 1986) would return productivity to acceptable levels in a relatively short number of years (Appendix H, Table H-1). No major long term impacts to the soil would be anticipated.

#### **Surface Lands**

Retention of essentially all public lands in North Dakota would generally cause the soil resource to remain the same. Retention of low value scattered tracts may have long-term negative impacts, due to the BLM not being able to manage the lands as effectively as other potential managers or owners.

By not consolidating lands into larger contiguous blocks, BLM would lose the opportunity to more efficiently manage the watershed to reduce impacts such as excess erosion and compaction.

Grazing under the current range management program would have positive impacts to soils. Soil conditions would improve in the long term due to an increase in vegetation production resulting in more cover and less erosion.

Management actions which limit ORV travel in the Big Gumbo area (22,164 acres) would result in no impact to the soil resource by ORVs. Occasional unauthorized ORV use on BLM public lands would cause slight erosion and compaction of soil in the short term.

#### **Other Mineral Estate**

Oil and gas exploration normally disturbs a small area of soils along a seismic line and drilling site. With proper cleanup and handling of soil, this activity only causes minor short-term impacts. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short-term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Oil and Gas Lease Stipulations would allow only minor erosion and compaction impacts to soil resources by prohibiting activities during muddy and/or wet periods. Erosion control is also called for on slopes of erodible soils cover 20 percent. In addition, special stipulations would be applied in all areas where it is felt necessary to protect other resources to the maximum reasonable extent within legal frameworks (Appendix K). This would include wetland and riparian stipulations to protect fragile soil resources. The 99,497 acres closed to all future leasing would experience no impacts to the soils from oil and gas development.

#### **Hydrology**

The identification of 484,592 acres as acceptable for further consideration and assumed coal leasing and development, identification of 32,273 acres of buried-valley aquifers as multiple-use tradeoff, identification of 38,536 acres to protect Dickinson's Municipal Watershed, ORV use restric-

By emphasizing trespass abatement, the small areas of public land that are being farmed would be returned to rangeland/pasture. The permanent cover returned would provide forage, habitat, and erosion protection that would be a long-term positive impact.

Management actions which limit vehicle travel in the Big Gumbo area to maintained roads and trails would minimize impact to vegetation by ORVs. Occasional unauthorized ORV use on BLM public lands would cause slight vegetative loss, erosion and compaction in the short term.

### Other Mineral Estate

Oil and gas exploration normally disturbs a small area of vegetation along a seismic line and drilling site. Assuming proper cleanup and handling of soil, these areas would be revegetated within one to two years. On sites where development occurs, one to four acres is normally cleared for the drilling facilities. Additional disturbance may be necessary for road access. If the site is a dry hole, reclamation would be accomplished in the short term. If the well goes to production, an area of usually less than an acre would remain stripped of soil until the oil and gas resources are depleted (20 to 30 years). An additional area of an acre or less may be necessary for each well to accommodate storage facilities. Upon abandonment disturbed areas would be regraded, soil material replaced and revegetated.

Application of Montana BLM Standard Oil and Gas Lease Stipulations would allow only minor impacts to vegetation by providing for erosion control, revegetation of disturbed sites, and compaction problems (activities may be prohibited during muddy and/or wet periods). Erosion control is also called for on slopes of erodible soils over 20 percent. In addition, special stipulations would be applied to protect fragile riparian and wetland vegetation. The closure of 99,497 acres to future oil and gas leasing would result in no vegetation impacts on these areas.

## Wildlife

The finding as acceptable and assumed leasing and subsequent mining of 484,592 acres of federal coal, including 6,117 acres of woody draws, would have substantial short- and long-term impacts on a variety of high priority wildlife species and their habitats. The application of special stipulations to oil and gas leases on 106,620 acres and closure of 99,497 acres to future leasing, and restricted ORV use on 22,164 acres of federal surface land would have beneficial short- and long-term impacts on high priority species and their habitats. The retention of all federal surface lands would have minor beneficial long-term impacts.

### Coal Study Areas

No federally-listed threatened and endangered species would be affected by this alternative. The bald eagle, peregrine falcon, and whooping crane migrate through the area, but their use of the planning area is erratic. No interior least terns, black-footed ferrets, or piping plovers are known to breed in the CSAs. However, they may occur on BLM surface tracts (see below).

No habitats were considered unsuitable under criteria 9, 10, and 12. Under unsuitability criteria 11, 13, 14, and 15, 148,045 acres of wildlife habitat are considered unsuitable for further consideration for coal leasing (Appendix C). In addition, another 12,809 acres are considered unsuitable under criterion 1, as it applies to wetlands under management for waterfowl production by the USFWS. Thus, the

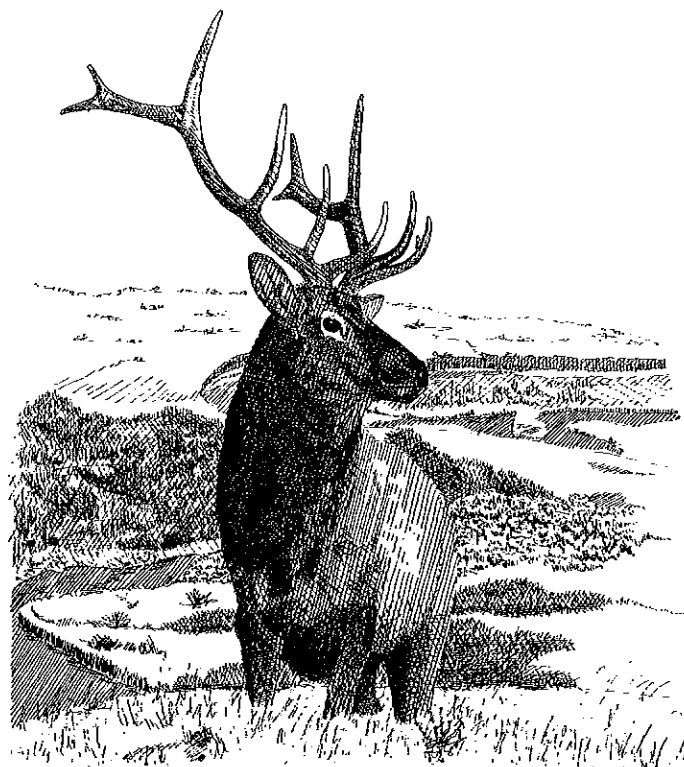
total acreage unsuitable due to wildlife values is 160,854 acres. A more detailed explanation of the habitats protected under criteria 11, 13, 14, and 15 follows.

Under criterion 11, 16,239 acres (Appendix C) are considered unsuitable due to golden eagle nest sites and buffer zones. These occur in five CSAs. Buffer zones include the nest site (typically a badlands cliff area) woody draws, native prairie, and, in some cases, agricultural lands.

Under criterion 13, 98 acres in the Keene CSA are considered unsuitable due to the buffer zone around a prairie falcon nest site.

Under criterion 14, 23,943 acres are considered unsuitable. These acreages occur in 12 CSAs. The habitats protected are, most notably, 11,419 acres of wetlands in the Velva CSA and 3,908 acres of wetlands in the Fortuna CSA. Many of these acreages occur adjacent to waterfowl habitat considered unsuitable under criterion 1. Other habitats unsuitable under this criterion are ferruginous hawk nest sites and their buffer zones in six CSAs. As with golden eagles, buffer zones include woody draws, native prairie, and agricultural lands where necessary.

Under criterion 15, 107,765 acres are considered unsuitable. These are predominantly large blocks of contiguous woody draw habitats in the Williston (50,270 acres), Tobacco Garden (36,711 acres), and Keene (11,805 acres) CSAs where a variety of high priority wildlife species occur, especially big game. In the Beulah-Zap CSA, 8,979 acres are unsuitable, primarily to preserve habitat for a pronghorn population that is locally important for observation and, in the past, hunting. Woody draws are also the main habitats protected in the Arnegard CSA.



impact to an individual farmer would depend on how much of his operation falls within the active mine area.

There would not be a significant loss of grazing land. Most of the grazing land was excluded under the multiple-use tradeoff screens for slopes and wildlife habitat. About 143,000 acres remain acceptable for further consideration. Reclamation of pasture lands has generally proved successful. Significant increases in total production are often possible but accompanied by a long-term loss of plant species diversity.

### **Surface Lands**

From a range management standpoint, this alternative is the least efficient to administer and makes it difficult to protect and manage the range resource. Small, scattered tracts often preclude effective management such as pasture rotation, enhanced distribution, or noxious weed control. If surface lands remain scattered, range condition could decline.

### **Other Mineral Estate**

There would be no significant long-term impacts to agriculture.

## **Lands and Realty**

There would be no significant impacts on the land resources resulting from coal leasing, developing oil and gas leases or disposing of mineral materials. An undetermined acreage of public land would be withdrawn to other agencies or patented via Color-of-Title Act or R & PP Act. There would be no other opportunities for repositioning of the land ownership. The long-term land pattern would remain fixed.

### **Surface Lands**

There would be no Bureau-initiated land disposals under this alternative. Applications for transfer of public lands such as R & PP Act patents, Color-of-Title patents, and withdrawals would be considered on a case-by-case basis. Disposing of significant acreages by withdrawals, R & PP act patents or Color-of-Title Act patents is not anticipated.

The current pattern of intermingled ownership would remain fixed for the life of the plan. Management difficulties because of remoteness, distance, access and size would continue.

The revocation of withdrawals no longer necessary would return an unknown acreage of lands to BLM administration. Land classifications would be removed from approximately 8,000 acres of public land. Removing the classifications would have no long-term adverse impacts, but would make the lands available for the highest and best use, as well as discretionary actions.

### **Other Mineral Estate**

There would be no significant adverse impacts on the land resources from exploring and developing oil and gas leases or permitting disposal of mineral materials.

## **Recreation and Visual Resources**

The finding of 484,592 acres acceptable for further consideration and assumed coal leasing and development, the application of Montana BLM Standard Oil and Gas Lease Stipulations (and additional special stipulations), the closure of 99,497 acres to future oil and gas leasing, and lim-

itation of ORV use on 22,164 acres would have insignificant impacts to recreation and visual resources.

### **Coal Study Areas**

Coal mining on portions of the CSAs found acceptable would remove this land as a recreational resource until it is reclaimed. The loss of these areas would create additional recreation pressure on surrounding land; however, after successful reclamation, this would be an insignificant impact. Increased regional population expected to result from mining and coal conversion would place additional demands on outdoor facilities such as Lake Sakakawea and Theodore Roosevelt National Park. Population growth would also increase demand for community and indoor recreational facilities. Mitigation of development impacts may require additional outdoor, indoor, and community recreational facilities.

Development of portions of the CSAs would have an impact on the visual resources of these areas. Due to the relatively flat terrain of the CSAs, mines and related facilities would intrude into the landscape. In most cases this would be an acceptable intrusion. Mine site and facilities near the Missouri breaks and Lake Sakakawea would impact the high visual resource values of this area. The need for and extent of a protective buffer zone would be determined during the review of specific lease proposals or during activity planning.

### **Surface Lands**

Essentially all public lands would be retained in federal ownership. Many of the public tracts are isolated and surrounded by private land. Access to these tracts is often difficult. Retention of tracts would impact recreation by prohibiting consolidation of public lands perpetuating access problems and limiting recreational opportunities.

This alternative would limit ORV opportunities on public land in the Big Gumbo area. Recreational use of public land would decrease, placing additional demand on surrounding areas.

### **Other Mineral Estate**

Oil and gas development, under standard lease stipulations, has an effect on recreation by limiting hunting and other dispersed activities in developed oil and gas fields and by generally decreasing the quality of recreational opportunities. This impact may be offset by additional road development that would enhance access to recreational areas. Continued oil and gas development would also increase hunting pressure on areas adjacent to development. Additional special lease stipulations and closures to leasing would reduce this impact. The impacts on recreational resources under these stipulations would be less than under all other alternatives.

Oil and gas development would have an effect on visual resources. If there is a new development, the intrusion of oil and gas facilities would have more of an impact. Mitigation of the impact would be accomplished by requiring the maintenance of the visual qualities of the landscape and ensuring that facilities have proper design, painting and camouflage, to blend in with the natural surroundings.

## **Cultural Resources**

The finding of 484,592 acres acceptable for further consideration and the assumed coal leasing and development, the closure of 99,497 acres to future oil and gas leasing, reten-

Stanton, Beulah, Hazen, Halliday, Killdeer, Dickinson, Belfield, Beach, Bowman, New England, Mott, and Elgin. Each of these communities is located in proximity to one or more CSAs and is large enough that it would attract in-migrants. Some of these communities such as Williston, Dickinson, and Beulah have experienced energy-resource-related development in the recent past.

Direct and indirect employment for the mine and facility would peak at approximately 2500 during construction, and level off to about 1150 during the operations phase (Table 4-1). Peak construction employment of 1400 for this mine and facility represents about 10 percent of the 1984 statewide figure for construction employment. Long-term mining and utilities (facility) employment represent 20 percent and 4 percent, respectively, of 1984 statewide employment figures. In-migration to communities surrounding the development would peak at about 2000 and decline to 1100 in the long term. The project and resulting in-migration could place considerable stress on local services and infrastructure during the construction phase, depending upon current community conditions and the size of the incoming population. In the long run, coal severance tax payments would increase 23 percent over 1985 statewide payments, and coal conversion tax payments would increase 31 percent over 1985. These payments could be used to meet some of the increased demand for public services.

The economic impacts of the mine and electric power generation facility on farm and ranch operations, expressed as the dollar value of agricultural production lost, would be \$138,600 annually. This represents 0.5 percent of the average value of the annual agricultural production (in 1982) of counties containing CSAs and about 0.006 percent of the value of the annual agricultural production for the state. Impacts of surface mining on the operation and management of livestock ranches could be more severe than on dryland farming (USDI 1981). Mine development located near the center of a ranch could seriously interfere with movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution and, in general, disrupt the overall operation. Compensation to the farm/ranch operator would depend upon the type of landowner lease, land ownership pattern, and percentage of land owned versus land leased. The greatest impacts would occur to operators who lease all the land which is removed from production; no compensation would be made for lost leases.

Social impacts include changes in social organization and social well-being, and depend upon the community itself and the number and types of in-migrants. Impacts to social organization (the way in which the people in the community relate to each other) could include: residents no longer knowing everyone else, greater diversity in resident lifestyles, changes in business transactions and government structures from casual to more formalized, increases in the level of outside influences in the community, and erosion of the traditional community power bases. These changes could be permanent, substantial, and intense. Impacts to social well-being could include: provisions of private and public services; increases in stressors such as strangers, noise, crowds, and crime; and increases in income for those who are able to find employment or expand business as a result of the development. Negative impacts to social well-being would be mostly of a short-term nature, noticeable primarily during periods of peak construction (Appendix I).

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character. Some area ranchers and farmers have organized in opposition to development because of their concern over regional impacts to air and water resources that they feel could affect their economic and social welfare and, ultimately, limit their future options. These agricultural producers are not convinced that the coal in the Fort Union region is needed to meet national energy goals or that the successful reclamation of agricultural land can be guaranteed.

Impacts to the Fort Berthold and/or Standing Rock Indian Reservations could occur if development takes place close to the Reservations. Potential in-migration would be influenced by the location of the mine and facility in relation to Reservation towns, the availability of services in the towns, and the relative location of off-Reservation towns. If there is significant migration onto one of the Reservations, the affected Tribe's cultural characteristics, social organization, and social well-being could be impacted. Services and facilities could be negatively impacted, decreasing social well-being. Positive impacts to social well-being could occur if Tribal members were able to acquire employment on energy projects. With increased employment opportunities, Indians who may have had to leave the Reservations for work may find they are able to stay in the area.

#### **Impacts of Other Management Actions**

In this alternative, land adjustment would not occur. There would be little or no impact to the area economy.

In this alternative acreage would be designated where leases require special stipulations or prevent surface occupancy. However, most land is currently under lease and would not be subject to special stipulations until the lease expires or otherwise terminates. These restrictions would generally not prohibit exploration and development, but would tend to increase costs. While the restrictions would have an effect on oil and gas development in specific areas, they are not major components in determining the extent of development. The price of these commodities and the relative availability and grade of local deposits will have a far greater effect on the development of these resources in the area. Exploration could provide jobs for the local economy. The extent of other employment in the oil and gas industry in the area will depend upon discovery of any deposits, the extent of such deposits, and their development potential.

This alternative would not change the general attitudes or values presently held by the residents of the study area, but it could affect attitudes toward and expectations of BLM. Individuals and groups concerned with environmental protection may support many aspects of these alternatives such as restrictions on ORV travel, special stipulations on some oil and gas development, and less coal acreage available for further consideration. Individuals and groups that favor resource development may feel the increased restrictions would hinder development.



A black and white photograph of a large, open field, possibly a sports field or a park. In the background, there is a fence or a line of trees. In the foreground, there are some trees and a path. The overall scene is bright and open.

## CHAPTER FIVE CONSULTATION AND COORDINATION

# CHAPTER FIVE

## COORDINATION AND CONSULTATION

### PREPARATION

The North Dakota RMP was prepared by specialists from the Dickinson District Office, with assistance and guidance from the Montana BLM State Office Disciplines. Skills used to develop this RMP were vegetation and range-land use, geology, hydrology, recreation, soil science, and air quality, archaeology and paleontology, realty, wildlife and fisheries, biology, animal science, forestry, economics, sociology, graphics and typing. Preparation of this RMP began in 1984 with a Federal Register notice of intent to initiate a planning activity.

### PUBLIC PARTICIPATION

Public participation occurred at three major steps during the preparation of this draft RMP/EIS:

- 1) Scoping or Identification of Issues,
- 2) Development of Planning Criteria, and
- 3) Surface Owner Consultation.

Public participation activities conducted during each of these steps are discussed below.

#### Scoping or Identification of Issues

Public participation activities for the North Dakota RMP/EIS began with the December 19, 1984, Federal Register Notice announcing the intent to initiate planning activity. This notice of intent also invited the public to suggest resource management issues to be considered, and included a call for coal resource information. A news release requesting similar public input was issued to media throughout North Dakota December 20, 1984. A supplement to the notice of intent identifying the four alternatives considered in the RMP/EIS was published in the February 28, 1986, Federal Register.

A brochure describing the BLM planning process, opportunities for public input, and anticipated planning issues was mailed to approximately 300 persons, groups, or agencies during February and March of 1985. This brochure included a return mailer for providing suggestions of issues to be considered in the plan. The Dickinson District received 33 responses to the brochure.

Five public meetings were held during March and April of 1985 to aid in identifying issues and planning criteria. The scoping meetings were held in Bowman, Dickinson, Hazen, Towner, and Williston, North Dakota. A total of 38 persons attended. News releases announcing the meetings and requesting suggested issues were issued to media servicing the general area surrounding the meeting locations.

#### Development of Planning Criteria

On July 10, 1985, a news release was issued to selected news media throughout North Dakota announcing the availability of issues and planning criteria. The issues and planning criteria were available for a 30-day comment period ending August 14, 1985. Two comments were received.

### Surface Owner Consultation

Beginning in December 1985, 1844 surface owners over federal coal were consulted regarding their preference towards coal mining. Three public open houses were held during December 1985 to answer questions regarding the consultation process. Two news releases were issued to announce the consultation process, open houses, and deadlines for response. These news releases were issued to media located in proximity to the CSAs and major population centers within the state (Appendix E).

### DISTRIBUTION OF RMP/EIS

Copies of this RMP/EIS are being provided to approximately 400 persons, groups, local governments, and agencies that have expressed interest in the management of public lands and minerals in North Dakota. The mailing list was compiled using names and addresses of (1) parties actively involved in past planning and environmental analysis activities, (2) parties responding to our call for suggested issues and resource information, (3) parties requesting further information during the preparation of the plan, (4) agencies, governments, and corporations potentially affected by the plan, and (5) agencies, groups, and tribes consulted during preparation of the RMP/EIS.

### AGENCIES AND ORGANIZATIONS CONSULTED

The North Dakota RMP team consulted and/or received comments from the following organizations and agencies during the preparation of this document.

American Fisheries Society  
Badlands Environmental Association  
Dunn County United Plainsmen Association  
Friends of the Earth  
Isaak Walton League  
Natural Resources Defense Council  
North Dakota Archaeological Association  
North Dakota Audubon Society  
North Dakota Lamb and Wool Producers Assoc.  
North Dakota Lignite Council  
North Dakota Petroleum Council  
North Dakota Paleontological Society  
North Dakota Stockmens Association  
North Dakota REC  
National Wildlife Federation  
North Dakota Wildlife Federation  
North Dakota Chapter The Wildlife Society  
Public Lands Council  
Rocky Mountain Oil and Gas Association  
Sierra Club  
Defenders of Wildlife  
Roughrider 4 X 4 and Off-road Club  
Watford City Wildlife Club  
United Sportsmen  
State and National Government  
Elected Officials

**Don Ruffedt, Soils Scientist**

Don prepared the soils, topography, and reclamation sections and assisted with the vegetation section. He has a BS in Soil Science from the University of Wisconsin at Stevens Point. He has 11 years of federal work experience, two years with the Bureau of Indian Affairs and nine years with the BLM.

**Gary Smith, Archaeologist**

Gary wrote the cultural resource management section, paleontology and other sections of the RMP. He has a BA in Anthropology from the University of Colorado at Boulder and a MA in Anthropology from Colorado State University. He has been with the BLM for one year.

**Lyle Chase, Range Conservationist**

Lyle wrote the agriculture and other sections of the RMP. He has a BS in Animal Science/Range Management from South Dakota State University. He has been with the BLM for 23 years.

**James Rasmussen, Environmental Scientist**

Jim wrote the air quality section and assisted in preparation of the oil and gas portions. He has a BA in Biology and Chemistry from Mount Marty College and a MES in Environmental Science from the University of Oklahoma. He has 10 years of federal experience, including seven years with the BLM.

**Linn Gum, Geologist**

Linn coordinated and assisted in the preparation of oil and gas portions. He has a BA in History and Geography from the University of Nebraska at Omaha and a BA in Geology and Environmental Science from the

University of Colorado at Colorado Springs. He has five years of federal service with Geological Survey, Minerals Management Service and BLM.

**Jim Hetzer, Writer Editor**

Jim wrote portions of the RMP and edited the document. He has a BA in Journalism from the University of Colorado at Boulder. He has been with the BLM for seven years.

**Joan Trent, Sociologist**

Joan wrote the sociology and economics portions. She has a BA in Psychology and a MEd in Environmental Science, both from Miami University of Ohio. She has six years of experience with the BLM.

**Management Guidance**

Management guidance was provided throughout the project by Ken Burke and Bill Krech of the BLM Dickinson District Office.

**Program Guidance and Review**

The BLM Montana State Office staff provided program guidance and review throughout the project.

**Other Specialists**

Word processing was accomplished in the Dickinson District Office by Jackie Kovash. Estimations of coal development potential and tonnages were prepared by John Spencer of the BLM Montana State Office. Graphics and printing were provided by Rick Kirkness and his staff of the BLM Montana State Office. Cartographic support was provided by Chuck Sigafos and Corla DeBar of the BLM Montana State Office.





# GLOSSARY, INDEX, AND LITERATURE CITED

# GLOSSARY

**ACTIVITY PLAN** — Activity plan is a generic term for any plan that provides details for management of a specific site. It implements decisions made in a RMP and is the most detailed level of BLM planning. Activity plans may be centered on a single resource. Examples are AMPs for livestock management and HMPs for wildlife management. However, BLM prefers to write activity plans that address all resources on a particular site. In this case, the plan is referred to as a CRMP. Examples of site-specific details included in these plans are: management objectives, location of a fence, placement of signs, dates of grazing by livestock, kinds and density of seeds to be included in seeding, costs of materials, economic analysis, and year action is to be completed.

**ALLOTMENT** — An allotment is an area of land where one or more livestock operators graze their cows or sheep. BLM, state-owned, and private lands may be included. Allotments are usually bounded by fences and/or natural barriers to livestock movement and are commonly subdivided into pastures to help in vegetation management.

**ALLOTMENT MANAGEMENT PLAN (AMP)** — An AMP is an activity plan (see above) that gives the details for managing livestock in a specific allotment (see above). The heart of an AMP addresses: (1) the number of livestock that will be allowed in an allotment, (2) the time of the year they will be there, and (3) the length of time they will remain.

**ALLUVIAL VALLEY FLOOR (AVF)** — The unconsolidated stream-laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities. Does not include upland areas, which are generally overlain by a thin veneer of colluvial deposits composed chiefly of debris from sheet erosion, deposits by unconcentrated runoff or slope wash, together with talus, or other mass-movement accumulations and windblown deposits.

**ALLUVIUM** — Unconsolidated clay, silt, sand, and gravel which has been deposited in valley floors by stream action.

**AMBIENT AIR QUALITY STANDARDS (AAQS)** — The permissible level of various pollutants in the atmosphere, as contrasted with emission standards which are the permissible levels of pollutants emitted by a given source.

**AQUIFER** — A formation, group of formations, or part of formation that contains enough saturated permeable material to yield significant quantities of water to wells and springs.

**ATTAINMENT AREA** — A physical, geographical area in which all AAQs are less than the air quality standard.

**BURIED-VALLEY AQUIFERS** — Sand and gravel deposits within drift-filled valleys and buried glacial drift. These aquifers occur within valleys that were eroded as much as several hundred feet into bedrock prior to and during the Pleistocene ice age.

**COAL STUDY AREA (CSA)** — An area of land that has sufficient coal development potential and federal coal ownership to identify areas as acceptable for further consideration for coal leasing and possible development of new mine areas and facilities.

**COAL WITH DEVELOPMENT POTENTIAL** — Coal with overburden of 200 feet or less, a stripping ratio of 20:1 or less, and a seam thickness of 5 feet or greater.

**COORDINATED RESOURCE MANAGEMENT PLAN (CRMP)** — A CRMP is an activity plan (see above) in which management of all pertinent resources on a site are addressed. CRMPs help ensure that the objectives of different resource programs, e.g., range, wildlife, recreation, archeology, are met in an efficient, coordinated manner.

**COUTEAU (COTEAU)** — A range of hills or an escarpment forming the edge of a plateau. In North Dakota, it refers to the Missouri Couteau that rises in a line generally northwest to southeast along the eastern edge of the Missouri (River) Plateau.

**CULTURAL RESOURCES** — Fragile and nonrenewable remains of past human activity, occupation, or endeavor as reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, or natural features.

**ENDANGERED SPECIES** — Any plant or animal species that is in danger of extinction throughout all or a significant portion of its range, as defined by the USFWS under the authority of the Endangered Species Act of 1973.

**FLOODPLAIN** — An area adjoining a body of water or stream that has been or may be covered by floodwater.

**HABITAT MANAGEMENT PLAN (HMP)** — An HMP is an activity plan (see above) that gives the details for management of one or more wildlife species or habitats in a specified geographic area.

**INFILTRATION** — The flow of a fluid into a substance through pores or small openings; connotes flow into a soil, in contrast with percolation, which connotes flow through a porous substance.

**ISSUE** — An element or topic of concern, interest or dispute as to its importance or management in a multiple-use approach to public land and its resources.

**LAND PATTERN ADJUSTMENT** — Repositioning the ownership of land surface and/or mineral estate by exchange, sale, etc.

**LAND REPORT** — A report substantiating and documenting the environmental effects and decisions of proposed lands and realty actions.

**LAND USE PLAN** — A comprehensive plan to guide future management of public lands and minerals. Development of land use plans involves an interdisciplinary approach to achieve an appropriate balance of multiple uses.

**LOCATABLE MINERALS** — Generally the metallic minerals subject to the filing of claims and development specified in the Mining Law of 1872, includes bentonite, uranium.

**LONG TERM** — Any natural process such as growth or regrowth of vegetation, or development of productive topsoil requiring 20 years or more.

**MULTIPLE USE** — Management of the various surface and subsurface resources, so that they are utilized in the combination of ways that will best meet the present and future needs of the public, without permanent impairment of the productivity of the land or the quality of the environment.

**MULTIPLE USE TRADEOFF** — Resource values of concern not covered by the unsuitability criteria which may

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# APPENDICES

# APPENDIX A

## FEDERAL COAL PLANNING PROCESS

The development of federal coal is a tiered process. As the size of the area of consideration is reduced, the amount of data and depth of analysis is intensified. Through this process, attention and detailed analysis becomes focused on those coal tracts most likely to be mined.

Prior to leasing federal coal, the BLM completes two levels of planning:

1. Land Use Planning, where coal deposits acceptable for further consideration are identified.
2. Activity Planning, where specific coal tracts are delineated for leasing.

After a tract has been leased, the State of North Dakota, in concert with the Office of Surface Mining Reclamation and Enforcement, analyzes a site-specific mining and reclamation plan, requires bonding and monitors the mining operation.

A description of the two planning processes undertaken by BLM prior to actual leasing or lease offering is provided below. Detailed descriptions are presented in the Final EIS Supplement, Federal Coal Management Program (USDI 1985) and in the federal coal management regulations presented in 43 CFR 3400. A flow chart depicting the general coal planning process is provided at the end of this appendix.

### Land Use Planning

During land use planning federal coal is analyzed for development potential and the presence of unacceptable environmental tradeoffs using four broad screens (43 CFR 3420.1-4):

- 1) coal development potential,
- 2) unsuitability criteria,
- 3) multiple-use tradeoffs, and
- 4) surface owner opposition.

The four screens are generally applied to federal coal within the planning area in the order presented unless it is obvious that later screens will apply. Each of the screens is discussed in detail in Appendices B through E.

The major land use planning decision concerning coal is the identification of areas acceptable for further consideration for leasing. The four coal screens constitute the framework used to identify areas obviously not suited to coal mining. Application of the four screens early in the overall coal planning process eliminates most potential environmental conflicts, allows coordination of management concerns and objectives between agencies and publics, and serves to focus future coal management on those areas best suited to mining. In addition to the finding of coal acceptable for further consideration, land use planning includes the identification of data inadequacies, and suggested mitigation or lease stipulations.

Adoption of a RMP by the BLM constitutes a major federal action and requires the preparation of an EIS. Coal-related portions of the alternatives of the EIS are generally based on variations in the application of the multiple-use tradeoff screen. The land use plan and related NEPA documentation ensure opportunities for public input and coordination with state and federal resource management agencies.

### Activity Planning

Activity planning provides the opportunity to review specific proposed lease areas in a detailed manner. The aerial scope of activity planning is much smaller than that of land use planning.

Activity planning involves the analysis of many of the same environmental factors as considered during land use planning but on a site-specific basis. Detailed inventories and analyses are conducted, as necessary to allow refinement and implementation of land use plan decisions. Activity planning allows the application of mitigation measures or stipulations prescribed in the land use plan to specific locations such as archaeological sites or wildlife habitats.

Activity planning also includes NEPA compliance; often in the form of an EIS. This analysis may include an assessment of expected cumulative environmental impacts in addition to site-specific analyses. The NEPA process also ensures opportunity for public input and coordination with state and federal resource management agencies.



# APPENDIX B

## IDENTIFICATION OF AREAS WITH COAL DEVELOPMENT POTENTIAL

Identification of areas with coal development potential is the first of the four land use planning screens of federal coal (43 CFR 3420.1-4). In applying this screen, the BLM utilizes coal information collected by federal agencies in addition to data provided by industry, state and local governments, and the general public. A public call for coal resource information was made in conjunction with the Notice of Interest for the Initiation of a Planning Activity (Federal Register, Vol. 49, No. 245; Dec. 19, 1984).

The BLM Branch of Solid Minerals, MSO, evaluated federal coal in North Dakota to determine areas with development potential.

Criteria for determination are:

- 1) Maximum 20:1 stripping ratio,
- 2) Maximum 200 feet overburden, and
- 3) Coal at least five feet thick.

If an area met all three criteria it was classified as having development potential. These parameters were used for coal with over 5,000 Btu/lb.

For the purpose of the RMP screening, legal subdivisions were used to describe acreages rather than free-flowing, and somewhat smaller, actual boundaries of the known coal resources. Tonnage figures used in the RMP were estimated by multiplying the acres of known coal with development potential by the minable seam thickness and average tons per acre foot.

Table B-1 gives the estimated tonnages for each of the study areas as well as some of the coal characteristics for each area.

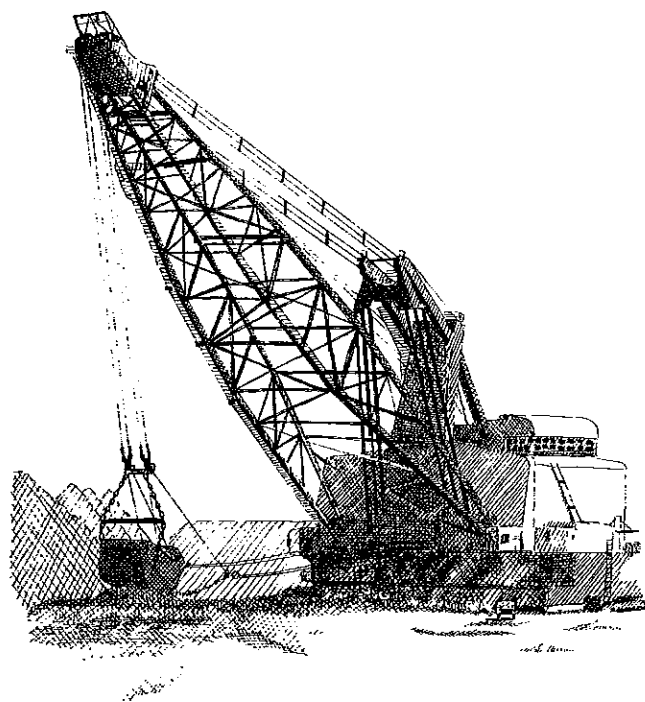


TABLE B-1  
COAL CHARACTERISTICS OF COAL STUDY AREAS

Coal Study Area	Tons of Coal With Development Potential (Millions)	Coal Beds in Descending Order	Bed Thickness (Feet)	Overburden/ Interburden to Bed Above (Feet)
Antelope	2,043	Beulah-Zap	15	0-200
Arnegard	348	Horse Creek	2.0-7.0	0-200
		HT Butte	2.5-17.9	67
Beulah-Zap	1,350	Beulah-Zap	11	0-200
		School House	8	
Bowman-Gascoyne	5,960	Harmon	8-31	0-200
		Hansen	5-15	30
Center-Stanton	1,086	Stanton	5-16	0-200
		Berg	3-8	
		Yeager	3-7	
		Upper Hagel	5-8	
		Lower Hagel	7-14	3-50
Dickinson	14,192	Dickinson	0-10	0-200
		Lehigh	0-5	30
		Heart River	0-29	50
		Fryburg	0-20	50
Divide	802	Noonan	7-10	0-200
		Unnamed	3-12	60
Dunn Center	5,126	C	1-10.5	0-180
		B	2-10.5	6-72
		A	0-8.5	31-113
		Dunn Center	7-26	2-124
Elgin-New Leipzig	721	Harmon	8	0-200
		Hansen	4	60
Elkhorn	258	Unnamed	5	0-200
Fortuna	674	Unnamed	7-22	30-200
		Unnamed	3-5	100
Garrison	1,852	Minter-Zone	1-15	0-100
		Garrison Creek		
		Zone	1.5-24	53-104
		Coteau	17-19	30
Golden Valley	1,096	Harmon	3-37	0-200
		Hansen	1-15	15-122
Hanks	2,476	Hanks	2-18	0-200
		Grenora	2-10	20-80
Keene	1,633	Keene	1.2-10.0	0-200
		Williston	3.0-13.4	3-110
Mott	1,346	Heart River	6.7	35-110
		Fryburg	7.4	35-110
		HT Butte	6	30-145
		Coal Bank Creek	7	3-100
		Garner Creek		
		(2 benches)	10	40-120
		Nomad	0-12	50-130
		Harmon	10	22-166
		Hansen	10	13-100
New England	4,947	Lehigh	6.7	0-200
Niobe	142	Bonus	5-11.5	36-103
		Niobe	3-8	36
Sand Creek	2,097	Williston	2-10	0-200
		Avoca	0-10	40
Tobacco Garden	650	Green	3-6	0-200
		Blue	4-12	80-140
		Yellow	4-10	50
Underwood, Washburn	345	Underwood	5-13	0-180
Velva	1,852	Coteau	16	0-200
Williston	2,777	Mormon	5.9-13.1	0-200
		Williston	3.9-12.1	210
		Avoca	0-12.1	39
		Pittsley	3.0-15.7	217

# APPENDIX C

## LANDS FOUND UNSUITABLE

The following is a summary of results obtained by application of each unsuitability criteria along with corresponding exceptions and exemptions. In general, criteria 1, 2, 3 and 6 refer to land status; criteria 4, 5, and 8 refer to recreational and natural values; criterion 7 refers to cultural resources; criteria 9 through 15 refer to wildlife; criteria 16 through 19 refer to watershed; and criterion 20 refers to issues proposed by the State. Acres dropped from further consideration due to coal unsuitability criteria in Alternative A are summarized in Table C-1. The summary for Alternative B, C, and D is presented in Table C-2. The following discussion applies to Alternatives B, C, and D.

### **Criterion 1 — Federal Land System**

Tracts totalling 13,939 acres were identified within the CSAs as unsuitable without exception. These lands included wetland easements, wildlife refuges, waterfowl production areas, and incorporated cities and towns.

### **Criterion 2 — Rights-of-Way Easements**

No areas were identified as unsuitable under this criterion.

### **Criterion 3 — Buffer Zones along Road Rights-of-Way and Adjacent to Communities, Public Schools, Occupied Dwellings, Churches, Public Parks, and Cemeteries.**

A total of 43,383 acres of road rights-of-way and buffers; lands under occupied dwellings; and areas containing cemeteries, schools, churches, parks, communities, or institutional buildings was identified as unsuitable for mining. It is expected that the exception to this criterion would often apply. Application of the exception requires site-specific data and, in some cases, additional public input.

### **Criterion 4 — Wilderness Study Areas**

There are no wilderness study areas located within the CSAs.

### **Criterion 5 — Scenic Areas**

No areas were identified as unsuitable under this criterion. There are no Class I visual quality lands identified within the CSAs.

### **Criterion 6 — Land Used for Scientific Study**

No areas were identified as unsuitable under this criterion.

### **Criterion 7 — Historic Lands and Sites**

No areas were identified as unsuitable under this criterion. There are no publicly owned places within the CSAs which are on the NRHP.

### **Criterion 8 — Natural Areas**

There are no designated natural areas or National Natural Landmarks within the CSAs.

### **Criterion 9 — Federally Designated Critical Habitat For Threatened and Endangered Species**

No areas were identified as unsuitable under this criterion.

### **Criterion 10 — State Listed Endangered Species**

No areas were identified as unsuitable under this criterion. There are no state-listed endangered species.

### **Criterion 11 — Bald and Golden Eagle Nest Sites**

Twenty-one golden eagle nests and buffer zones, totalling 16,239 acres, were identified as unsuitable. No bald eagle nest sites are known within the CSAs.

### **Criterion 12 — Bald and Golden Eagle Roost and Concentration Areas**

No areas were identified as unsuitable under this criterion. There are no Bald and Golden Eagle roost and concentration areas within the CSAs.

### **Criterion 13 — Falcon Cliff Nesting Sites**

One prairie falcon cliff nest site and appropriate buffer zone, totalling 98 acres, was identified in conjunction with USFWS as unsuitable under this criterion. No other falcon cliff nest sites have been identified within the CSAs.

### **Criterion 14 — Migratory Birds of High Federal Interest**

High priority habitat and appropriate buffer zones for ferruginous hawks and canvasbacks, totalling 23,943 acres, were identified in conjunction with the USFWS.

### **Criterion 15 — State Resident Fish and Wildlife**

A total of 107,765 acres of essential habitat for species of high interest to the State of North Dakota were identified as unsuitable. The habitat consisted mainly of year-round and winter ranges for big game populations.

### **Criterion 16 — Floodplains**

Criterion 16 applied to 15,515 acres of floodplains on which mining would pose a substantial threat of loss of life or property. Only the floodplains of major streams and tributaries were deleted. Floodplains of lesser streams were not deleted because mining was not identified as posing a substantial threat of loss of life or property.

### **Criterion 17 — Municipal Watersheds**

No areas were identified as unsuitable under this criterion. There have been no municipal watersheds designated by the Surface Management Agency within the CSAs.

### **Criterion 18 — Natural Resource Waters**

No areas were identified as unsuitable under this criterion. There are no natural resource waters within the CSAs.

### **Criterion 19 — Alluvial Valley Floors**

A total of 32,009 acres within the CSAs were identified as preliminary AVFs based on geologic maps, color infrared air photo interpretation, and comparison with 1:100,000 scale reconnaissance maps of AVFs in West-Central North Dakota, prepared in 1983 for the Office of Surface Mining. These areas have been included in all figures, maps, and tables as unsuitable within the CSA.

### **Criterion 20 — State Proposed Criteria**

The State of North Dakota has proposed no unsuitability criteria.

# APPENDIX D

## MULTIPLE-USE TRADEOFFS

Coal planning regulation 43 CFR 3420.1-4e(3) states that "multiple land use decisions shall be made which may eliminate additional coal deposits from further consideration for leasing, to protect resource values of a locally important or unique nature not included in the unsuitability criteria."

Surface resource values, oil and gas values, municipal utilities, coal values, and industry's interest and prior commitments were considered in the screening process to obtain a balance between resource conflicts.

### Factors in Analysis

Eight resource categories and factors were defined that could be significantly affected by mining. These were:

1) Buffer zones around incorporated cities and towns, unincorporated towns, residential subdivisions, power generation facilities, industrial concentrations, MINUTEMAN missile silos (2.5 mile radius), and an agricultural experiment station were identified as unacceptable for further consideration for coal leasing. Buffer zones around cities and towns were determined by population levels: less than 500 persons one-fourth mile, greater than 500 persons — one-half mile.

2) Utility and transportation routes including: MINUTEMAN missile communication cables (200 foot corridor), MINUTEMAN missile silos (2.5 mile radius), electric transmission lines 230 KV and larger, pipelines 12 inches in diameter and larger, and all operating railroads (100 foot corridor) were considered to be unacceptable for further consideration for coal leasing.

3) The eligible KRF Quarry National Register District contains 3,761 acres of Federal coal. Due to the significance of these resources, all federal coal within the District boundaries has been dropped from further consideration for coal leasing.

Forty acres of Federal coal surrounding Writing Rock Historic Site and 160 acres surrounding the A.C. Townley farmstead were dropped from further consideration for coal leasing because of historic significance.

4) Tracts with known high wildlife values that did not qualify under criteria 14 and 15 were identified as unacceptable, or acceptable with stipulations for further consideration for coal leasing. Each CSA has an individual thresh-

hold percentage for leasing that was determined from the particular values of the CSA (Table D-1). Once the threshold percentage is reached, no further leasing can occur without a joint review of the situation in the CSA by BLM, NDGFD, and USFWS. The intent of the threshold approach is to protect a portion of the remaining higher value habitats without having to arbitrarily specify precise geographic areas.

5) Steep, rough topography has high aesthetic value, high potential to erode if disturbed, and is difficult to reclaim. Steep slopes greater than 30 percent) were dropped from further consideration for leasing under Alternatives A and C. Under Alternative B no acres were dropped because industry has successfully reclaimed small areas of extreme slope. In Alternative D slopes greater than 15 percent were dropped.

6) Major oil and gas fields defined by the North Dakota Industrial Commission were dropped. Field boundaries are established by the State of North Dakota. Major fields were identified based on total production, likelihood of future production and expected life.

7) A total of 38,536 acres were excluded to protect the City of Dickinson's municipal watershed. This watershed is located along the Heart River, Dickinson's only source of municipal water.

8) Buried-valley aquifers are protected under Alternative D because they contain high quality water, have relatively high flows, and are at a shallow depth. Buried-valley aquifers may be used for domestic and/or irrigation purposes.

### Methods

Transparent overlays for each of the eight multiple-use tradeoffs were delineated on 1:100,000 scale base maps for each of the 24 CSAs. The presence of any one multiple-use conflict was sufficient to drop an area from further coal leasing. These overlays are available for review in the Dickinson District BLM office.

### Results

Areas deleted due to multiple-use conflicts are summarized in Tables D-1 through D-5 by CSA and alternative.

**TABLE D-2**  
**ALTERNATIVE A**  
**ACRES EXCLUDED FROM FURTHER CONSIDERATION DUE TO MULTIPLE-USE TRADEOFFS**

CSA	Slopes 30%	Wildlife Refuge Watershed	Buried- Valley Aquifer	Intensive Use Buffer	Oil & Gas Fields	Wetlands	Municipal Watershed	Land Use Plan Consist.	Lake Buffer Zone	Gross Total	Net Total
ANTELOPE	0	0	0	0	0	0	0	0	0	0	0
ARNEGARD	0	0	0	0	0	0	0	0	0	0	0
BEULAH-ZAP	0	0	0	0	0	0	0	0	0	0	0
BOWMAN-GASCOYNE	0	1440	0	0	0	0	0	0	0	1440	1440
CENTER-STANTON	0	0	0	0	0	0	0	0	0	0	0
DICKINSON	0	0	0	0	0	0	54492	0	0	54492	28986
DIVIDE											
DUNN CENTER	0	0	0	0	0	0	0	0	800	800	0
ELGIN-NEW LEIPZIG	100	0	0	0	0	0	0	0	0	100	100
ELKHORN											
FORTUNA											
GARRISON	0	0	0	0	0	0	0	0	0	0	0
GOLDEN VALLEY	0	0	0	0	0	80	0	0	0	80	80
HANKS	1920	1760	1200	0	0	0	0	0	0	4880	4605
MOTT	240	1000	0	0	0	0	0	0	0	1240	1031
NEW ENGLAND	620	0	0	0	0	0	0	0	0	620	620
NIOBE											
SAND CREEK	1050	240	520	440	0	0	0	320	0	2570	2410
TOBACCO GARDEN	5860	0	6440	0	0	0	0	0	12230	24530	2507
UNDERWOOD	0	0	0	0	0	0	0	0	0	0	0
VELVA											
WASHBURN	0	0	0	0	0	0	0	0	0	0	0
WILLISTON	31390	0	2360	0	10168	0	0	0	23357	67275	3493
TOTAL	41180	4440	10520	440	10168	80	54492	320	36387	158027	45272

**TABLE D-4**  
**ALTERNATIVE C**  
**ACRES EXCLUDED FROM FURTHER CONSIDERATION DUE TO MULTIPLE-USE TRADEOFFS**

CSA	Wildlife Threshold	Municipal Watershed	Intensive Use Buffer	Oil & Gas Fields	Cultural Resources	Slopes 30%	High Use, Utility, Trans.	Gross Total	Net Total
ANTELOPE	1082	0	0	0	0	2264	718	4064	3436
ARNEGARD	2147	0	0	920	0	46	75	3188	3108
BEULAH-ZAP	1627	0	0	0	0	3952	1970	7549	4013
BOWMAN-GASCOYNE	1301	0	0	0	0	0	559	1860	1828
CENTER-STANTON	1316	0	0	0	0	374	921	2611	2457
DICKINSON	290	38536	0	9400	0	894	1548	50668	42877
DIVIDE	0	0	0	0	0	0	3	3	0
DUNN CENTER	382	0	0	1520	3761	1995	1294	8952	6859
ELGIN-NEW LEIPZIG	219	0	0	0	0	220	0	439	399
ELKHORN	2442	0	0	0	0	1802	63	4307	4185
FORTUNA	169	0	0	2400	40	0	522	3131	2028
GARRISON	0	0	0	0	0	0	8602	8602	5623
GOLDEN VALLEY	0	0	0	480	160	0	212	852	852
HANKS	3947	0	0	0	0	2597	399	6943	6663
KEENE	5618	0	0	46280	0	3866	261	56025	49462
MOTT	1300	0	0	0	0	433	0	1733	1591
NEW ENGLAND	196	0	0	0	0	981	280	1457	1266
NIOBE	0	0	0	0	0	0	0	0	0
SAND CREEK	2328	0	440	3840	0	1379	1920	9907	8406
TOBACCO GARDEN	0	0	0	0	0	22597	0	22597	283
UNDERWOOD	0	0	0	0	0	0	15	15	0
VELVA	0	0	0	0	0	100	4261	4361	1596
WASHBURN	130	0	0	0	0	227	12	369	273
WILLISTON	811	0	0	13200	0	35751	693	50455	9030
TOTAL	25305	38536	440	78040	3961	79478	24328	250088	156235

# APPENDIX E

## SURFACE OWNER CONSULTATION

The 1977 Surface Mining Control and Reclamation Act (SMCRA) and implementing regulations (43 CFR 3420.1-4) require that all comprehensive land use plans involving potential coal leasing shall include consultation with qualified surface owners over federal coal. During the week of December 2, 1986, letters were sent to 1844 surface owners requesting the surface owner to state his/her preference for or against the surface mining of federal coal under his/her land. Surface owners were requested to respond before January 21, 1986. A news release announcing the consultation process and deadlines was provided news media located throughout western North Dakota. Three open houses were held in Dickinson, Williston and Hazen, North Dakota, to answer questions of surface owners. A follow-up letter was sent during the week of January 20, 1986, asking that all responses be returned to BLM by February 14, 1986. Another news release announcing the extended deadline was issued to media located throughout western North Dakota.

Surface owners were not recontacted in portions of the nine CSAs that were considered in the McKenzie-Williams and Southwest North Dakota MFPs (USDI 1984c, d) because the views expressed during the preparation of these plans were considered up-to-date. All surface owners located over federal coal in the remaining 15 CSAs were contacted.

In the letter, owners were asked to show themselves as: (1) in favor of, (2) against, or (3) unsure about leasing of federal

coal underneath their surface. They were also asked to state if their surface was already under lease by a coal company and whether they met the requirements as a qualified surface owner under SMCRA. A sample of the consultation letter and response form are included at the end of this appendix.

Areas with significant surface owner opposition were dropped from further consideration for leasing. Eight decision factors were used in combination to delineate areas of significant opposition:

1. Number of landowners over federal coal within the CSA opposed to leasing;
2. Acreage included under "opposed";
3. Percent of federal coal in the CSA;
4. Distribution of federal coal;
5. Distribution of "opposed" comments;
6. Location, size, and number of existing federal leases;
7. Location, size, and number of private and state coal leases;
8. Location, size, and number of surface lease agreements on lands over federal coal.

Results of surface owner consultation are shown in Tables E-1 and E-2.

TABLE E-1  
SUMMARY OF SURFACE OWNER CONSULTATION<sup>1</sup>

Coal Study Area	Letters Sent	Responses Received	Percent Response	Surface Owners Qualified or Assumed Qualified	Qualified Owners Under Previous Consent Agreements	Qualified Owners Under Previous Consent Agreements Responding "Opposed"	Qualified Owners Without Previous Consent Responding "In Favor"	Qualified Owners Without Previous Consent Responding "Unsure" <sup>2</sup>	Qualified Owners Without Previous Consent Responding "Opposed"
Antelope	147	57	39	141	26	9	15	14	21
Arnegard <sup>3</sup>	93	57	61	90	2	0	5	8	38
Beulah-Zap	167	70	42	154	23	3	19	20	18
Bowman-Gascoyne <sup>4</sup>	99	50	51	99	30	10	19	—	11
Center-Stanton	107	44	41	96	25	3	15	7	11
Dickinson <sup>3</sup>	417	216	52	400	37	21	17	22	137
Divide	24	14	58	22	0	0	1	1	10
Dunn Center	285	149	52	272	53	34	30	14	92
Elgin-New Leipzig, Mott, and New England <sup>5</sup>	529	290	55	529	78	44	26	0	162
Elkhorn	72	33	46	68	0	0	5	6	18
Fortuna	99	62	63	93	1	1	16	18	22
Garrison	72	39	54	67	4	2	7	7	20
Golden Valley	94	55	59	86	18	2	8	15	24
Hanks <sup>4</sup>	175	115	66	175	28	13	10	—	61
Keene	191	89	47	179	1	1	11	23	46
Niobe	2	1	50	2	0	0	0	0	1
Sand Creek <sup>4</sup>	263	140	53	263	42	18	18	—	71
Tobacco Garden <sup>3</sup>	162	77	48	158	2	0	6	12	41
Underwood	6	4	67	6	1	0	2	1	1
Velva	83	39	47	80	4	0	7	8	20
Washburn	13	8	62	10	4	0	2	1	2
Williston <sup>4</sup>	303	141	47	303	49	23	30	—	61
Total	3403	1750	51	3293	428	184	269	177	888

<sup>1</sup>Numerical summary only; identification of significant opposition was based on maps and overlays located in the Dickinson District Office.

<sup>2</sup>Tabulations of "unsure" responses are not available for CSAs or portions of CSAs included in the McKenzie-Williams and Southwest North Dakota MFPs.

<sup>3</sup>Portions of surface owner consultation conducted during preparation of McKenzie-Williams or Southwest North Dakota MFPs.

<sup>4</sup>Surface owner consultation conducted during preparation of McKenzie-Williams or Southwest North Dakota MFPs.

<sup>5</sup>Consultation results combined in Southwest North Dakota MFP.



# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT DICKINSON DISTRICT OFFICE

P.O. Box 1229  
Dickinson, ND 58602

Dear Landowner:

The Bureau of Land Management (BLM) is screening federal coal areas to identify which areas should be considered further for possible leasing in accordance with the Department of the Interior's coal management regulations. The screening is part of the process of preparing a resource management plan for public lands and federal minerals managed by BLM in North Dakota.

Our review of federal and county records shows that you own the surface of lands in which the United States has retained ownership of the coal. On the enclosed consultation form you will find the legal description of these lands.

The Surface Mining Control and Reclamation Act of 1977 gives certain types of protection to surface owners who qualify under the law. The law contains both a consent requirement and a consultation requirement. If you qualify, the BLM cannot issue a coal lease and authorize a company to surface mine the coal under your land unless you agree to let that mining take place (the consent requirement). The surface mining law also requires BLM to consult with surface owners as part of the planning process and ask whether they favor or oppose leasing of coal under their land (the consultation requirement).

The purpose of this letter is to consult with you and to give you a chance to tell us whether you favor or oppose leasing the coal under your land. The BLM is not now proposing to lease the coal under you land. Also, we are not asking for your consent to leasing and mining. The resource management plan we are preparing will help us decide which coal lands in North Dakota should and should not be considered further for possible leasing. The decision on which specific coal lands will be leased will be made in a separate process.

The reason for this consultation with you and other surface owners in your area is to give the BLM an opportunity to understand your feelings about surface mining of coal under your land. The coal under your land might be included in a tract which we would offer for federal leasing. However, if a significant number of qualified surface owners in your area are opposed to surface mining of coal under their land, we may decide to refrain from leasing any federal coal in that area for surface mining. If this is the case, receiving your views at this early stage of planning will allow us to avoid making specific plans for coal leasing in your area.



### The Effect of Significant Opposition to Leasing

If a significant number of surface owners in your area oppose leasing for surface coal mining, the BLM may issue no leases in the area, even though some surface owners do favor surface coal mining under their land. Just how many surface owners would amount to a "significant number" cannot be answered at this time. This will have to be determined on a case-by-case basis for each coal study area. But, in no case will the coal under your land be leased without your consent if you are a qualified surface owner.

### Qualified Surface Owners

The protections of the surface mining law apply only to surface owners as defined by the surface mining law. The law defined surface owners as a person or persons who:

- (1) hold legal or equitable title to the land surface;
- (2) have their principal place of residence on the land; or personally conduct farming or ranching operations upon a farm or ranch unit to be affected by surface coal mining operations; or receive directly a significant portion of their income, if any, from such farming or ranching operations; and,
- (3) have met the conditions of paragraphs (1) and (2) for a period of at least three years prior to the granting of consent.

If you meet the requirements of law listed above, you can help ensure that your preferences are considered in the BLM planning process by letting us know that you meet each of the requirements. If you do not meet the requirements, please let us know this also.

### If Consent to Mine has Already Been Given

If you have already given your consent to a coal company or someone else to surface mine the coal under your land, it is important that the BLM know about this in preparing its land use plans. The enclosed consultation form provides an opportunity for you to list any such agreements.

If you have already given your consent to surface coal mining on your land, the BLM must consider you to be in favor of mining those tracts to which the consent agreements apply [according to BLM regulations 43 CFR 3420.1-4 (e)(4)(ii)].

### Outside Advice

You may want to seek the advice of someone outside the federal government (for example, neighboring surface owners, a lawyer, or someone familiar with surface coal mining operations) before you answer this letter.

(See step-by-step instructions on the reverse side.)

### Legal Description

**LANDOWNER SIGNATURE**

DATE \_\_\_\_\_

# APPENDIX F

## LANDS ACCEPTABLE WITH STIPULATIONS

Included in the acreage acceptable for further consideration for coal leasing are lands with special reclamation stipulations for wildlife and buried-valley aquifers. Originally 240,465 acres were included in this category. However, overlap with other unsuitability criteria, multiple-use trade-offs, and surface owner opposition reduced the acreages. The net acreages appear in Table F-1.

The wildlife habitats in this category include native prairie with gentle slopes, small scattered wetlands, shelterbelts, woodlots, and small riparian areas. The specific sites are mapped (1:100,000) and are available for inspection in the Dickinson District Office. The vegetative reclamation stipulation for each parcel will be that an acreage equivalent to that disturbed be reclaimed to approximately its former condition (e.g., species diversity, production, canopy cover).

Buried-valley aquifer stipulations will be evaluated on a site-specific basis. Stipulations will depend on the action needed to prevent damage to the ground water hydrology of the aquifer.

**TABLE F-1**  
**COAL ACREAGES WITH SPECIAL STIPULATIONS**

Coal Study Area	Vegetative Reclamation Stipulation		Buried-Valley Aquifer Stipulation	
	Alternative B	Alternative C	Alternative D	Alternative C
Antelope	7,168	6,780	5,395	486
Arnegard	1,313	1,272	1,182	384
Beulah-Zap	13,215	12,593	7,259	1,152
Bowman-Gascoyne	5,053	5,025	4,746	0
Center-Stanton	5,630	5,496	4,944	256
Dickinson	7,336	7,336	5,442	0
Divide	1,490	1,490	1,453	49
Dunn Center	16,988	16,652	14,787	1,945
Elgin-New Leipzig	3,686	3,686	3,628	0
Elkhorn	5,043	4,952	1,884	64
Fortuna	4,557	4,557	2,652	2,483
Garrison	246	246	160	26
Golden Valley	738	738	738	0
Hanks	6,271	6,222	5,265	179
Keene	16,680	16,680	5,672	2,432
Mott	10,913	10,897	9,489	0
New England	17,047	17,021	16,781	0
Niobe	80	80	80	0
Sand Creek	15,211	15,006	11,126	588
Tobacco Garden	1,751	1,705	1,377	793
Underwood	55	55	7	0
Velva	540	540	513	201
Washburn	400	339	224	0
Williston	10,166	10,102	5,316	1,280
Totals	151,577	149,470	110,120	12,318

# APPENDIX G

## SUMMARY OF AREAS ACCEPTABLE FOR FURTHER CONSIDERATION

CSA	ACRES ACCEPTABLE BY ALTERNATIVE			
	A	B	C	D
ANTELOPE	18265	29436	28014	24385
ARNEGARD	2037	12580	11290	6513
BEULAH-ZAP	9670	43591	41134	28348
BOWMAN-GASCOYNE	19560	19694	19261	18199
CENTER-STANTON	11695	23523	22706	21309
DICKINSON	23469	52473	50027	46163
DIVIDE		2819	2819	2790
DUNN CENTER	27208	62963	61390	54442
ELGIN-NEW LEIPZIG	12900	13743	13436	12948
ELKHORN		18531	17017	11271
FORTUNA		7310	7197	4973
GARRISON	6817	2343	2343	2198
GOLDEN VALLEY	11413	17611	17780	17650
HANKS	40234	38911	34765	29355
KEENE		46300	42553	26619
MOTT	40379	41115	39803	36120
NEW ENGLAND	73100	78065	77195	76100
NIOBE		160	160	160
SAND CREEK	49350	41831	39775	32974
TOBACCO GARDEN	4092	9791	9596	7907
UNDERWOOD	1030	1605	1605	1416
VELVA		2633	2562	2166
WASHBURN	983	1189	1002	687
WILLISTON	38977	28799	27958	19899
TOTAL	391179	597016	571388	484592

# APPENDIX H

## GENERIC MINE SCENARIO

The purpose of this appendix is to present the major probable impacts of mining. This analysis forms the basis of summaries of coal-related impacts presented in Chapter Four. More detailed analyses of specific coal development can be found in the Fort Union Regional Coal DEIS (USDI 1982) and the related Fort Union logical mine-size tract site specific analyses.

The generic mine considered is a 5.5 MM ton per year surface mine with a 40 year mine life. Mine operation is expected to disturb land at a rate of 475 acres per year or 19,000 acres over 40 years. It would take approximately 10-13 years for completion of the full cycle from initial disturbance through mining, reclamation, and bond release for each acre. In full production, the total area out of production in any year would be 4,800 to 6,175 acres. Soils would be continuously replaced on mined-out areas and brought back into production during the life of the mine.

The uncertainty of the mine location and size will limit this analysis to a general treatment. This analysis is based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are based on best estimates. Others are based on existing literature, research studies, and input from industry sources. This analysis is not meant to substitute for detailed, site-specific evaluations, EISs, or analyses that come later when mining projects are actually proposed. Nor will it preclude any federal, state, local, or private decisions concerning actual mine siting, mining methods, or mine reclamation.

## ENVIRONMENTAL CONSEQUENCES

### Air Quality

All pollutant sources must be evaluated to determine if PSD regulations apply. Preliminary evaluations indicate that production emissions (coal dust) would be less than 250 tons/year; therefore, the coal mine is not a PSD source. However, the State PSD regulations specify that if the fugitive dust emissions cause the total potential particulate emissions to be in excess of 250 tons/year, the emissions are counted against the PSD increment.

Dispersion modeling was performed to predict particulate concentrations for comparison with State and National AAQs. Areas within the active mining area, such as the mine facilities, pit areas, and reclamation areas, are not subject to these standards. The mine would emit an estimated 2610 tons per year of particulate matter.

The highest annual concentration at a location off the mine site would be 6.2 ug/m<sup>3</sup>. Adding the annual background concentration of 24 ug/m<sup>3</sup> this level would consume the allowable Class II PSD annual increment for particulates of 19 ug/m<sup>3</sup>. This level does not exceed the State or Federal AAQs of 60 ug/m<sup>3</sup>.

In addition to the annual particulate standard of 60 ug/m<sup>3</sup>, North Dakota has a 24-hour standard of 150 ug/m<sup>3</sup> that cannot be exceeded more than once per year off the mine

site. The predicted highest 24-hour values associated with the proposed action during peak production is 47 ug/m<sup>3</sup>. This level would consume the allowable Class II PSD 24-hour increments for particulates of 30 ug/m<sup>3</sup>. With the estimated 24-hour background concentration of 100 ug/m<sup>3</sup> added, the ambient level would be 147 ug/m<sup>3</sup>. This level does not exceed the State and Federal AAQs.

Because a new mine would consume the allowable Class II PSD increments for particulates, any associated PSD source could not contribute significantly (5 ug/m<sup>3</sup> — 24-hour) to the PSD's Class II annual or 24-hour particulates increment.

Several small sources of gaseous pollutants are associated with surface coal mining operations. During peak production, these emissions are not expected to violate air quality standards. Gaseous emissions for mining sources were not modeled because of their expected limited impacts to the air quality.

### Topography

The natural contour of the land would be modified during surface mining. Although most would be returned to its approximate original contour, difference in detail would remain, including drainage patterns and final sloped highwalls. The reshaped land would not be steep enough to cause slope failures and related hazards.

### Soils and Reclamation Potential

Mining would result in the disruption of the present soil bodies with temporary loss of productivity, erosion, compaction, and instability.

The alteration of soil structure and porosity would affect permeability, infiltration rates, soil-air and soil-water relationships, and bulk density. The natural fertility would be reduced by disruption of the nutrient cycle and a decrease in organic matter content. Soil erosion and compaction would increase during soil handling activities but decrease during other stages of mining.

Some instability problems are usually associated with the onset of reclamation. Area-wide settling, localized subsidence or collapse, and underground erosion called piping may occur (Groenewold and Rehm 1980). The gentle to moderate slopes over most of the land remaining in the CSAs after application of the coal screens would aid in the workability of material and make corrective measures on problem spots easier to conduct. Until natural vegetation can be established, accelerated erosion resulting in unsightly scars on the land would be a potential problem. However, if the regulations and required stipulations covering the handling of soils and overburden during surface mining operations are closely adhered to and enforced, these impacts would be minimal.

The mining company would be under bond for at least ten years, or as long as necessary to prove (at a 90 percent confidence level) that agricultural production had been restored to equal or better than it was before mining (NDPSC 1986). Reclamation research by such agencies as the USDA

**TABLE H-1**  
**TYPICAL RECLAMATION TIME TABLE**

Year	Rangeland	Cropland	Woody Draws	Comments
1	Strip and remove topsoil, remove overburden, commence mining	Strip and store topsoil, remove overburden, commence mining	Strip and store topsoil, remove overburden, commence mining	
2	Mining continues	Mining continues	Mining continues	Non-Productive Time Period
3	Mining ends, overburden replaced, recontouring begins	Mining ends, overburden replaced, recontouring begins	Mining ends, overburden replaced, recontouring begins	
4	Recontouring completed, topsoil replaced, seeded to native vegetation	Recontouring completed, topsoil seeded with nurse crop of grasses and legumes	Recontouring completed, topsoil replaced, seeded back to woody plants	
5	Native vegetation established	Nurse crop established	Woody plant reestablishment continues	
6	Native vegetation growth	Nurse crop growth	Woody plant reestablishment continues	
7	Light grazing	Cropping begins	Woody plant reestablishment continues	
8	Light grazing	Cropping continues	Woody plant reestablishment continues	Productivity returns to normal
9	Light grazing	Cropping continues	Woody plant reestablishment continues	
10	Light grazing	Cropping continues	Woody plant reestablishment continues	
11	Moderate grazing	Cropping continues	Woody plant reestablishment continues	
12	Moderate grazing	Cropping continues	Woody plant reestablishment continues	
13	Moderate grazing	Cropping continues	Woody plant reestablishment continues	
14	Eligible for bond release	Eligible for bond release	Eligible for bond release	

This table is based on a mining operation that is consuming land at the rate of 475 acres per year. It would require a 13-year time period for each 475 acres to complete the full cycle from initial disturbance through mining, reclamation and bond release. By the 14th year, land would be returning to full production at the same rate it was being taken out of production. The last 475 acres to be mined would not be eligible for bond release until ten years after mining is completed. Facilities and haul roads take out an additional 600 acres for the life of the mine. In this example, during the height of mining activity as much as 36 percent of the 6775 acres could be removed from agricultural production.

local areas of North Dakota. The presence of mining likely would be considered as a normal part of activity on the land. Some of the public view mines as a blight on the landscape, whereas others find them interesting. From an aesthetic stand point, provided State and Federal law is complied with, impacts can be considered unavoidable but reversible.

## Wildlife

On-site effects to wildlife resources result from the degradation and short-term loss of native prairie and the long-term loss of wooded draws. Of the 19,000 acres that would be disturbed by a mine about 4,750 acres would be native prairie and 570 acres would be wooded draws. The rest of

the disturbed habitat would be agricultural land. Because the structural features and productivity of prairie can be reclaimed the 1,544 acres out of production at any one time would have the most direct effects on prairie wildlife. However, it is also likely that once the topography of rougher prairie habitats is smoothed during reclamation, some acreages would then be suitable for conversion to agricultural uses. Therefore, mining of native prairie could constitute a long-term significant negative impact and an irretrievable commitment of wildlife resources on up to 4,750 acres.

Wooded draw habitats would be disturbed at the rate of 14 acres per year. Loss of woodlands may become a permanent loss because the ability to reclaim this habitat has not been demonstrated. In all instances, reclamation would

# APPENDIX I

## GENERIC END-USE FACILITY

The purpose of this appendix is to present the major probable impacts of facility development. Many of the analyses presented here are based on the detailed analysis presented in the Fort Union Regional Coal DEIS and related logical mine size tract site-specific analyses (USDI 1981b, 1982).

The generic end-use facility would produce 1,000 mw of electricity over 289 days of operation.

The uncertainty of end-use facility location and size will limit this analysis to a general treatment. This analysis is not meant to substitute for detailed site specific analyses, EISs, or analyses that come later when facility projects are actually proposed. Nor will it preclude any federal, state, local, or private decisions concerning actual end-use, facility siting, or end-use restrictions.

This analysis is based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are best estimates. Others are based on existing literature, facilities, and input from industry sources.

The low energy value and high water content of lignite coal constrains transportation of lignite. Therefore, it is assumed that an end-use facility would be near the mine.

### DESCRIPTION OF THE FACILITY

A generic coal-fired electric power generation plant would consist of two 500 mw (gross) units located near a lignite coal source. The facility has an average operation factor of 0.90 and a load factor of 0.85. It would be capable of delivering a maximum of approximately 900 mw to the existing transmission system. The facility would consist of the following units: (1) coal preparation, storage, and handling; (2) power generation; (3) pollution control and waste disposal; and (4) utility and transportation corridors. The total land area dedicated to the facility would be approximately 600 acres.

#### 1. Coal Preparation, Storage, and Handling

Lignite coal would be transported from a nearby mine to a three-day storage pile or a sixty-day storage pile. From the 3-day storage pile, the coal would be sent by conveyor to be crushed before being transferred to the plant silos for intermediate storage. Finally, coal would be reconditioned before introduced into the furnace for ignition. A generic plant would burn approximately 800 tons of coal per hour or about 5.5 MM tons per year.

#### 2. Power Generation

The crushed coal is combined with air supplied by forced-draft fans and then ignited and burned in the boiler furnaces. The combustion in the boiler furnace produces heat that creates steam from feed water entering the boiler heat-exchange system. After releasing energy through expansion in the high-pressure section of the turbine, steam is returned to the boiler for reheating. After being reheated, steam is returned to the intermediate section and subsequently to the low-pressure section of the turbine. Spent

steam passes through the condenser where waste heat is removed, and the condensed liquid is returned to the boiler feed water system. Combustion gases from the furnace are exhausted to the atmosphere through the pollution control devices. Steam energy is converted to mechanical energy by the turbine and subsequently transformed into electrical energy by the generator. Generated power is routed through the main transformer for voltage step-up and then to a switchyard and transmission line system for distribution.

The water for the power plant systems would come from a nearby river or impounded water source. Demineralization of the filtered water for boiler makeup will be necessary to provide water of the required quality for the steam generation system. The treated water would then be stored for use. There will be several holding ponds included at the facility to store recoverable water.

The cooling system for the electric power facility would be mechanically induced draft wet-type cooling towers. Cooling tower blowdown would be sent to a holding pond to be used for ash sluicing, scrubbers or coal dust suppression.

#### 3. Pollution Control and Waste Disposal

Burning lignite in the boiler produces gaseous emissions, fly ash, and bottom ash. The gas from the boiler passes through a fabric filter baghouse and an SO<sub>2</sub> dry scrubber, and is dispersed by a 600-foot stack.

Bottom ash from the main boiler, pyrite rejected from the pulverizer, and ash discharged from the hoppers will be hydraulically conveyed to dewatering bins. The ash will then be loaded into trucks and transported to the adjacent mine for disposal.

The plant will include a dry scrubbing system to absorb SO<sub>2</sub> from the flue gas. The scrubber product will be treated prior to disposal with dry fly ash. The fly-ash/scrubber product would likely be blended with water for dust control and stabilization. Emission of nitrogen oxides will be controlled by designing the boiler for proper mixing and flame quenching. The quantity of wastes produced by the power facility would be approximately 80 tons per hour of fly-ash/scrubber product and 10 tons per hour of bottom ash.

The air emissions will depend primarily on: (1) the conversion process, the emission control technology used at the facility, and the level of control used, (2) the sulfur, ash, and water content of the lignite, (3) whether or not the facility produces its own electric power. For this analysis it will be assumed that the facility will produce its electric power with coal-fired boilers and steam turbines.

#### 4. Utility and Transportation Corridors

Water will be pumped from the water source to a surge pond. The water pipelines will require a rights-of-way probably consisting of a 100-foot-wide construction easement and a 50-foot-wide permanent easement. The surge pond would have a water surface area of approximately 42 acres and would contain 1,050 acre-feet of water. Transportation corridors would be required for roads and a railspur. The transmission line leaving an electric power facility would be a 500 KV line with a right-of-way 150 feet wide connecting with an existing system.



(2) direct and indirect impacts from the increase in human population.

The removal of vegetation for the facility and the expansion of urban areas, highways, and railroads would prevent or greatly reduce the use of an area by wildlife regardless of the type of vegetation removed. Thus, careful siting of the facility is necessary to limit the destruction of areas that contain important habitats or migration corridors.

If powerlines, pipelines, access and haul roads are constructed in key wildlife areas, partial or total destruction of habitat could occur, depending on the magnitude of development. Wildlife-oriented recreation such as hunting and observation would have to be sought elsewhere. Wildlife would be impacted by electrocutions and collisions with powerlines, road kills along transportation routes, and other factors discussed in Appendix H.

The impact to wildlife could be mitigated by: (1) siting the electric power plant and associated facilities with regard for essential wildlife areas, (2) adjusting work shifts so that employees are not traveling when deer or pronghorn are crossing roads, (3) providing mass transportation for employees, (4) providing funds to State fish and game agencies to better control illegal shooting of wildlife, and (5) adopting a poaching clause in union contracts.

Taking water from shallow bays in Lake Sakakawea could have significant adverse impacts. These areas are prime nursery and spawning areas for sport, commercial, and forage fish. Taking water from deeper noncritical areas of the reservoir could reduce or eliminate the significant impacts to fisheries. The cumulative increases in industrial, urban, and other water uses would dictate the severity of the impacts on fisheries.

## Cultural Resources

There are two types of impacts to cultural resources anticipated for a power generation facility: (1) Direct adverse impacts are those that result from ground disturbance that can damage or destroy sites, artifacts, their environmental context, and the data they contain. (2) Indirect adverse impacts are uncontrollable but predictable and include vandalism increased by improved access, loss as a result of erosion, or degradation resulting from disruption of natural settling.

In the event of a facility site selection, stipulations covering cultural resources would be developed. These stipulations would require the identification and evaluation of cultural resources which may be adversely impacted by mine development.

Preservation is the preferred form of mitigation for sites determined eligible and subject to direct impacts; however, if preservation is not possible, the adverse impacts to significant cultural resources would be reduced by data recovery methods. It is estimated that construction of an end use facility would directly impact five sites. Additional impacts to cultural resources would occur by construction of utility and transportation corridors. It is not possible to estimate the number of sites which would be impacted by corridor construction until a specific proposal is received. In general direct adverse impacts to expected site types within a typical facility area could be mitigated successfully through existing data recovery methods.

## Visual Impacts

Most of the planning area has a high but common visual quality. The landscape is not highly valued as scenery because of the vast distances involved in crossing this relatively uniform area. Most highways roll with the landform, so views alternate between nearby lack of features at low points and panoramas of up to 30 miles at high points. The landscape is seen in terms of these short vistas of landscape elements that would not be seen again, and short duration views of distant landscapes in which any vertical object or landscape feature serves as a focal point.

Large structural features in the regional landscape contrast with the landscape both in terms of the visual surface (the character of what is seen) and in terms of function. Vertical and linear components of a facility, because of hard architectural edges of the structures, and the transitory nature of panoramic views imply a visual importance of these large objects for orientation. The aesthetic response is secondary to this visual function.

Neglecting cultural bias, the aesthetic response to stark architectural lines and pure planes of color contrasting with the simple curvilinear landforms of the countryside can be considered positive. This visual experience would be immediately comprehensible and would provide relief from a relatively uniform countryside. Beyond initial responses, however, are responses with origins in cultural bias and the individuals' relationships to the land. The greatest effect would be upon local residents with memories of the existing landscape to use as a comparative basis of judgment. If no attachment to the existing landscape is present, the facility would be judged more on its quality than on cultural bias.

The visual impact would be the penetration of the skyline by the facility in views from communities and major transportation corridors. The 600-foot stack could potentially be seen 30 or more miles away. The facility would be highly visible and would demand a response either positive or negative. The dominance of the facility in the landscape could be perceived as a loss of amenity through impairment of the landscape as it now exists for the 40 years of the facility's expected life.

## Paleontological Resources

Direct adverse impacts to paleontological resources may occur within a typical power generation facility. Current data indicates that common and rare fossil sites are located within the boundaries of some CSAs. Indirect adverse impacts to paleontological resources may also occur due to an increase in population in the mine area and improved access to fossil resources near the facility.

Direct adverse impacts would be mitigated through avoidance or a data recovery program. In most cases the loss of data would be minimal. Indirect adverse impacts are uncontrollable and it is anticipated that some loss of data would occur.

## Economic and Social Conditions

### Economic

Direct employment would peak at approximately 1,550 people during the third year of the project (Table I-1). Long-term operation employment would total approximately

**TABLE I-4**  
**LOCAL EMPLOYMENT GENERATED BY THE MINE**  
**AND FACILITY<sup>1</sup>**

Year	Local Construction Employment	Local Operations Employment	Local Indirect Employment	Total Local Employment
1	250	50	200	500
2	600	50	500	1150
3	700	100	600	1400
4	400	100	550	1050
5	300	200	550	1050
6	300	200	550	1050
7	350	200	600	1150
8	100	250	500	750
9	0	250	450	700
10-40	0	250	450	700

<sup>1</sup>Based on assumptions detailed in Table I-5. (Employment is rounded to the nearest 50.)

**TABLE I-5**  
**POPULATION IN-MIGRATION ASSOCIATED WITH**  
**THE MINE AND FACILITY<sup>1</sup>**

Year	Population Associated with Direct Employment Construct.	Population Associated with Indirect Employment <sup>2</sup> Oper.	Total Incoming Population
1	350 <sup>2</sup>	50	250
2	1000	100	600
3	1150	200	700
4	700	250	650
5	550	400	650
6	500	400	650
7	600	400	700
8	150	550	600
9	0	550	550
10-40	0	550	550

<sup>1</sup>Population is rounded to the nearest 50.

<sup>2</sup>There would be a 6-month lag period between direct construction and operation employment and associated indirect employment.

**Assumptions<sup>1</sup>:**

	Construction Work Force	Operation Work Force	Indirect Work Force
% Local Hires	50	60	70
% Incoming Unmarried	15	8	12
% Incoming Married, Family Absent	10	0	0
% Incoming, Family Present	25	32	18
Average Family Size, Incoming Families	2.3	3.5	3.6

<sup>1</sup>Sources: Murdock & Leistritz 1979, Leistritz & et al. 1982, USDI 1984e, Halstead & Leistritz 1983.

During the initial construction period of large-scale energy projects, considerable stress may be placed on local services and infrastructures such as housing, schools, police, sewage, etc. Unless specific plans are made to avoid the situation (see mitigation discussion), there is a lag period between the time the service and infrastructure demands increase and when monies such as coal conversion and coal severance taxes are available to deal with the increased demand.

This section discusses revenues generated by the electric power generation plant and expenditures needed to meet the increased service demand. The analysis focuses on services that are provided by local governments: schools, water treatment and distribution, sewage collection and treatment, police and sheriff protection and fire protection. The taxes examined are the major ones directly related to mine and facility development: coal severance, coal conversion, and mine property taxes. (The coal conversion facilities tax replaces property taxes on the plant itself.) With minor exceptions, these taxes are distributed to the county in which the mine and facility are located to be distributed to the county, city, and schools. (Other sources of revenue for local entities that will not be considered here include local property taxes, federal revenue sharing, user fees, special assessments, highway funds, cigarette and tobacco taxes, and education transfers. These would accrue both to the counties where the development occurred and to surrounding counties.)

The expenditure and revenue data presented here cannot be directly compared. This is because some revenues are specific to the producing county, whereas expenditures cover all in-migrating populations that would probably locate in a multi-county area.

Tables I-6, I-7, and I-8 present estimated revenues to coal development counties and expenditures for incoming population. The tables show the types and magnitudes of expenditures required by incoming population (if services were to be provided) and the types of revenues that would be received. Expansion costs of schools (Table I-7) and waste water systems and water distribution and treatment facilities (Table I-8) would be some of the largest expenses incurred. Local governments would have to decide whether to develop for peak or long-term populations. A lag period usually occurs at the beginning of development, where expenditures have increased but revenues have not.

Those communities that experience significant long-term fiscal deficits could have problems in providing an adequate overall level of services. Additional funding, over that which would legislatively flow to the community as a result of economic development and/or population increases, would be necessary if the incoming population is to be provided with adequate public services.

### Social

The type and magnitude of social impacts are based on the ability of the community to adapt to change and the change itself (BLM *Guide to Social Assessment*, USDI 1982a). In general, communities that have a large diverse population base, experience with development, ties to outside organizations, a diverse labor force, adequate services and facilities, experienced leadership and a positive attitude toward growth will be able to deal well with population growth. Small communities with no historical experience with development, few linkages to nonlocal organizations, a fairly uniform population, an inadequate service base, and inexperienced leadership are more likely to have problems dealing with population growth.

in-migrants were different than current residents. Social organization impacts due to coal development in western North Dakota are discussed in detail in the Fort Union Coal Region Draft EIS (USDI 1982, pages 143-152).

At this level of planning, it is impossible to determine if in-migration would occur on the Fort Berthold or Standing Rock Indian Reservations. Potential in-migration would be influenced by the location of the mine and facility in relation to Reservation towns, the availability of services in Reservation towns and the relative location of other towns outside the Reservations. If there is significant migration onto one of the Reservations, the affected Tribe's cultural characteristics could be impacted. This would be addressed in subsequent planning efforts when mine and facility locations are available.

With an increase in regionwide population, more non-Indians may travel onto Fort Berthold Reservation lands for recreation, which could lead to an increase in jurisdictional disputes on the Reservation. However, because the area around the Reservation has been the scene of intense energy development activity in the past, many of the processes necessary for dealing with such impacts should be in place.

Impacts to social well-being depend upon the pre-existing level of community social well-being and the size and type of the incoming population. Negative impacts to social well-being would be greatest in situations where predevelopment services and infrastructure were inadequate, the town is small relative to the population increase, and the types of in-migrants are different than the current residents. These impacts may be mostly of a short-term nature, noticeable primarily during periods of peak construction.

Beneficial changes in social well-being would accrue to those people who were able to acquire employment or who benefited from business expansion as a result of the increased income in the community. The availability of local employment may allow some younger people to remain in their communities to work if they desire, reversing youth out-migration trends which currently characterize many rural areas.

The increase in income which would accompany the increase in employment would enhance the well-being and possibly raise the standard of living of those positively affected. It could also create disparity in groups or between individuals who did not benefit.

Population growth would cause increased demand for public and private services of all types. In some cases the capacity of towns to respond would be overwhelmed, especially if services were currently inadequate or providers were not used to handling the types of problems which they would be encountering. This strain on services would reduce the availability or distribution of resources to long-time users and newcomers alike.

An increase in the number of strangers passing through town, noise, crowds, traffic, and other stresses would also occur. These disturbances could be particularly distressing for those residents who had never had to deal with such problems before. Although people would likely adapt to these changes, which would be most intense during peak construction phases, they might regret the loss of the quiet, slow-paced small town atmosphere they previously enjoyed.

Some area ranchers and farmers may perceive major threats to their social and economic well-being if coal

development occurs. In smaller communities where they currently possess a measure of power and prestige, disparity in wages and possibly a change in the power base caused by population growth could leave ranchers and farmers feeling estranged from the emerging community character.

Some area ranchers and farmers have organized in opposition to development because of their concern over regional impacts to air and water resources which they feel could affect their economic and social welfare and ultimately limit their future options. These agricultural producers are not convinced that the coal in the Fort Union region is needed to meet national energy goals or that the successful reclamation of agricultural land can be guaranteed.

Impacts to social well-being on the Fort Berthold and Standing Rock Reservations depend on population in-migration to the Reservations. This is discussed in preceding paragraphs. Services and facilities would be negatively impacted if significant in-migration were to occur. In addition, because of regionwide impacts to service and facility provision, Indians may find themselves negatively impacted if they travel off the Reservation for shopping, medical services, etc. The increased traffic, crowded conditions, and other stressful situations they could encounter could make such trips unpleasant. These conditions would be most noticeable during the peak construction periods.

Positive impacts to social well-being would be most apparent if members of the Tribes were able to acquire employment on energy projects. With increased employment opportunities, Indians who may have had to leave the Reservations to look for work may find they are able to stay in the area.

Impacts on social well-being are also discussed in detail in the Fort Union Coal Region Draft EIS cited above.

### **Mitigation**

Coal mine and facility development would eventually help to diversify the economy of western North Dakota. Secondary and tertiary expansion, due to new energy growth, would result in a sectoral change from an agricultural to a construction-trade oriented economy. At the community level this would translate into a broader range of goods and services being offered and greater employment opportunities; however, in the short run, public service costs incurred with energy growth might well exceed base tax revenues.

Short-term, energy-related impacts may have an adverse effect on baseline municipal services in some of the communities identified. Adequate planning and management capabilities are essential in developing mitigation strategies. The lack of adequate planning may result in fiscal problems, inadequate or excessive investment in community infrastructure, and a decrease in the quality of life.

There appear to be five critical factors that must be present to mitigate some of the adverse economic or social impacts that could result from rapid energy growth. These factors are: accurate information, adequate lead time, planning expertise, adequate financial resources, political leadership. If any of these five factors are missing, it is likely that a community will not be able to significantly alleviate the adverse effects of energy related growth. These factors are discussed in detail in the Fort Union Coal Region Draft EIS (USDI 1982) on pages A25-A31.

### **Agricultural Economics**

The economic impacts of the mine and facility on farm and

# APPENDIX J

## WITHDRAWALS AND LAND CLASSIFICATION

More than 330,800 acres of public land have been withdrawn in North Dakota. The listing of withdrawals (Table J-1), with some dating back to 1903, is not all-inclusive. This is due to incomplete Bureau records for portions of eastern North Dakota. Excluding the USFS, the agency managing the greatest amount of withdrawn lands is the USFWS. Other agencies holding withdrawals include the Army Corps of Engineers, NPS, and the SCS.

North Dakota is not considered to be one of the eleven western states of FLPMA and thus does not have the withdrawal review requirements of Section 204. However, there are withdrawals in the state requiring review. It is suspected some of the withdrawals may not be fulfilling their intended purpose.

### Federal Power Act Withdrawals

A review of available records has not revealed any Federal Power Act Withdrawals.

### International Boundary Reservation

The International Boundary Reservation was established by Presidential Proclamation No. 810 of June 15, 1908, and modified by Presidential Proclamation No. 1196 of May 3, 1912. The withdrawal affects a strip of public land 60 feet wide along the border with Canada. The withdrawal segregates the lands from operation of the public land laws, including mining, but not the mineral leasing laws. The U.S. State Department has been determined to be the holding agency for the withdrawal and, therefore, has surface management responsibilities.

Upon receipt of a rejustification from the U.S. State Department —International Boundary Commission, the withdrawal will be reviewed. Because it is a single withdrawal for a single purpose involving a single holding agency, the entire withdrawal will be processed as one case. This entails the coordinated effort of all the states involved with the BLM — Oregon State Office, being designated the lead office. Although BLM in North Dakota is not bound by the review schedule of Section 204 of FLPMA, it will hold to the schedule to facilitate the other states involved to meet the schedule.

In North Dakota, withdrawn lands vary from a continual strip 60 feet wide, two miles long to periodic tracts one-fourth mile long. Surface use on the withdrawn area is usually grazing or farming.

### Classifications

Classifications under the C & MU Act of approximately 8000 acres of land have been terminated (Table J-2). These classifications were reinstated by Civil Action No. 85-2238.

Land classifications technically are not withdrawals (Associate Solicitor's Opinion of August 19, 1980) and are subject to the review provisions of Section 202 (d) of FLPMA. Because certain classifications segregate lands from operation of some or all of the public land laws, they are considered to be "de facto" withdrawals. Some of the classifications are no longer appropriate or restrict activities which should be at the discretion of the authorized officer. The district will consider all the existing classifications in the state, including those not listed on the table referred to above, and alter or cancel those necessary to realize the fullest range of uses.

TABLE J-1  
WITHDRAWALS

Serial Number	Agency	Executive Order Date	County	Acres
M 43233 (ND)	USFWL	2-26-46	Benson	3,708
M 43235 (ND)	USFS	7-19-37	Billings, Golden Valley	271,091
M 43236 (ND)	USFS	7-18-64	Billings	89
M-43246 (ND)	Bur. of Rec.	1-20-05	Williams	10,600
M-43247 (ND)	Bur. of Rec.	4-27-14	Williams	40
M-43255 (ND)	Bur. of Rec.	7-70095	Williams	560
M-43248 (ND)	Bur. of Rec.	5-23-05	Williams	80
M-43288 (ND)	Bur. of Rec.	8-24-03	McKenzie	21,763
M-43289 (ND)	Bur. of Rec.	9-02-05	McKenzie	1,263
M-43290 (ND)	Bur. of Rec.	2-16-12	McKenzie	209
M-43291 (ND)	Bur. of Rec.	10-23-09	McKenzie	146
M-43292 (ND)	Bur. of Rec.	7-09-09	McKenzie	25
M 013419 (ND)	Corps. of Eng.	2-25-55	Benson, McLean, Williams	4,681
M 013726 (ND)	USFS	3-31-55	McKenzie	80
M 013826 (ND)	Corps. of Eng.	7-06-56	Burleigh, Morton, Emmons	3,029
M 3842 (ND)	Corps. of Eng.	7-06-56	Burleigh, Morton, Emmons	3,903
M 021926 (ND)	Corps. of Eng.	2-27-59	Morton, Williams	941
M 040002 (ND)	Corps. of Eng.	4-24-62	Bowman	3,280
M 050235 (ND)	Corps. of Eng.	4-19-63	Burleigh	433

**TABLE J-2**  
**C & MU ACT CLASSIFICATIONS**

<b>County</b>	<b>Acres Affected</b>	<b>Serial Number</b>	<b>Classified for</b>	<b>Segregated from</b>
Divide	1625.63	M498A	Multiple Use Management	Agricultural entry, Sale
McHenry	1242.92	M498B	Multiple Use Management	Agricultural entry, Sale
McLean	280.00	M498C	Multiple Use Management	Agricultural entry, Sale
Mountrail	397.32	M498D	Multiple Use Management	Agricultural entry, Sale
Sheridan	511.40	M498E	Multiple Use Management	Agricultural entry, Sale
Ward	224.30	M498F	Multiple Use Management	Agricultural entry, Sale
Williams	320.00	M498G	Multiple Use Management	Agricultural entry, Sale
Pierce	82.34	M498H	Multiple Use Management	Agricultural entry, Sale
Barns	4.56	M498I	Multiple Use Management	Agricultural entry, Sale
Burleigh	520.00	M498J	Multiple Use Management	Agricultural entry, Sale
Emmons	526.13	M498K	Multiple Use Management	Agricultural entry, Sale
Kidder	208.58	M498L	Multiple Use Management	Agricultural entry, Sale
Logan	560.00	M498M	Multiple Use Management	Agricultural entry, Sale
McIntosh	172.84	M498N	Multiple Use Management	Agricultural entry, Sale
Stutsman	80.00	M498O	Multiple Use Management	Agricultural entry, Sale
Mountrail	259.40	M10484E	Exchange, Sale	Agricultural entry, Mining
Williams	300.18	M10484F	Exchange, Sale	Agricultural entry, Mining
Mountrail	40.00	M10484G	R & PP	Agricultural entry, Sale, Exchange, Mining
Williams	160.00	M10484H	R & PP	Agricultural entry, Sale, Exchange, Mining
Mountrail	240.05	M10484I	Multiple Use Management	Agricultural entry, Sale, Exchange
Williams	120.00	M10484J	Multiple Use Management	Agricultural entry, Sale, Exchange
Mountrail	40.00	M16435	Multiple Use Management	Agricultural entry, Sale, Exchange

# APPENDIX K

## OIL AND GAS LEASE STIPULATIONS AND LEASING RESTRICTIONS

The following stipulations only apply to mineral-related activities in the planning area. These stipulations do not dictate surface management on private lands but are intended only to provide required protection of important resources that otherwise may be impacted by federal actions. The areas of federal oil and gas covered by the following stipulations are portrayed in Map K-1. At APD time, negotiations between the surface owner, operator, and BLM may be undertaken to incorporate specific needs of the surface owner. This may result in small adjustments to buffer zones, for example, where adequate protection can be provided without strict adherence to specific distances set forth in the stipulations.

### Definition

**Surface Occupancy** — Occupancy of the land surface with pumps, drilling rigs, tank batteries, roads and other facilities that require repeated visits or maintenance.

**Exceptions** (may be applied to any stipulation)

These limitations do not apply to maintenance and operation of producing wells. This stipulation may be waived or reduced if circumstances change, or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts. Exceptions to this limitation in any particular year may be specifically approved in writing by the authorized officer.

### Stipulations and Leasing Restrictions

#### Threatened and Endangered Species

*(All Alternatives)*

The Surface Management Agency is responsible for assuring that the leased land is examined prior to undertaking any surface-disturbing activities to determine effects upon any plant or animal species, listed or proposed for listing as endangered or threatened, or their habitats. The findings of this examination may result in some restrictions to the operator's plans or even disallow use and occupancy that would be in violation of the Endangered Species act of 1973 by detrimentally affecting endangered or threatened species or their habitats.

The lessee/operator shall, unless notified by the authorized officer of the Surface Management Agency that the examination is not necessary, conduct the examination on the leased lands at his cost. This examination must be done by or under the supervision of a qualified resources specialist approved by the Surface Management Agency. An acceptable report must be provided to the Surface Management Agency, identifying the anticipated effects of a proposed action on endangered or threatened species or their habitats.

**Elk Winter Range** (No elk winter range has been identified as of this date. Stipulation will apply if and when such habitat is identified.)

*(Alternative C)*

No seismic exploration, construction, or other development would be allowed on elk winter range between November 30 and May 1.

*(Alternative D)*

No leasing would be allowed on elk winter range.

**Elk Calving** (No elk calving habitat has been identified as of this date. Stipulation will apply if and when such habitat is identified.)

*(Alternative C)*

No seismic exploration, construction, or other development would be allowed on elk calving range between June 1 and July 1.

*(Alternative D)*

No leasing would be allowed on elk calving range.

**Sage Grouse** (up to 48,705 acres)

*(Alternative C)*

NSO would be allowed within 200 feet of strutting grounds. No seismic exploration, construction, or other development would be allowed within two miles of strutting grounds between March 1 and June 30.

*(Alternative D)*

No leasing would be allowed within two miles of sage grouse strutting grounds.

**Wetlands**

*(Alternative A)* (282 acres)

NSO would be allowed to protect wetlands from possible pollution.

*(Alternatives C, D)* (up to 57,355 acres)

NSO would be allowed within 200 feet of wetlands, lakes and ponds.

No seismic exploration would be allowed within 500 feet of waterfowl nesting habitat between March 1 and July 1.

**Ferruginous Hawk** (up to 55,005 acres)

*(Alternative C)*

NSO would be allowed within one-half mile of ferruginous hawk nests known to be occupied at least once within the seven previous years. No seismic exploration, construction, or other development would be allowed within 1.2 miles of occupied nests between April 1 and July 15.

*(Alternative D)*

No leasing would be allowed within 1.2 miles of ferruginous hawk nest sites known to be occupied at least once within the seven previous years.

# APPENDIX L

## OIL AND GAS PROCESSING PROCEDURES

### Application for Permit to Drill Approval:

Although oil and gas operations physically start after the APD is approved, the BLM's oil and gas responsibilities actually begin before the oil and gas lease is issued. The District's responsibilities include review of competitive and noncompetitive leases and nomination of new tracts for leasing with recommendation of special stipulations to be added to these leases. These stipulations cover a wide spectrum of subjects, often ranging from wildlife protection to hydrocarbon-drainage protection, and usually have some effect on the Federal permitting process. Once the leases are issued the lessee, or his designated operator, can then proceed to initiate the permitting process.

An initial step in permitting the well drilling process is approval of an APD. When applying for an APD the operator has two options which can be followed — the Notice of Staking (NOS) option or the APD option.

**NOS Option** — Prior to filing a complete APD, the operator may, at its option, file a NOS with the authorized officer of the BLM. The notice must include a survey plat, and cut and fill diagrams of all proposed areas of disturbance. If all required information is not included, the NOS is usually returned to the operator for modification.

When a complete NOS is received, a review is performed to identify the need for associated rights-of-way and special use permits, cultural resource clearance, wildlife conflicts, or other associated surface concerns. An onsite predrill inspection must be conducted within 15 days of receipt of the NOS.

During the predrill inspection, the surface use and reclamation stipulations must be developed and provided to the operator, within five working days from the date of the inspection. The operator must then incorporate these stipulations into a technically complete APD and submit it to the authorized officer.

When the APD is received, it is reviewed for completeness and technical adequacy. Once all required information is received, the District has 10 days to approve the application.

**APD Option** — When using this option, the operator need not file a NOS or any other paperwork prior to submittal of the complete APD. Once the APD is received by the authorized officer, a review must be completed and the operator must be notified as to whether the application is complete or deficient within seven working days of receipt of the application.

An onsite inspection must be conducted with the operator or his representative within 15 days of receipt of the APD to develop the surface use and reclamation stipulations that will be included in the approved application. Under this option the District has 30 days to complete processing of the APD from the date it is technically and administratively complete.

All applications are reviewed for aspects of:

1. Public Health and Safety
2. Unique Characteristics
3. Environmental Controversy
4. Uncertain and Unknown Risks
5. Establishment of Precedent

6. Cumulatively Significant
7. Cultural Resources and eligibility for NRHP
8. Endangered and Threatened Species and
9. Violations of Federal, State, and Local Law.

If the problems are identified and could not be mitigated, an EIS would be required.

### Drilling Operations:

Once the APD is approved, the operator may begin construction of the well pad, access road, and may start drilling the well. The operator is required to report the spud date (date drilling begins) within 48 hours of commencement.

An inspection must be made of each well while it is being drilled to ensure compliance with Federal Regulations and the approved APD. If some aspect of the APD is not being met, an Incident of Noncompliance must be written and a follow-up inspection may be required. Different phases of the drilling at which inspections may be made include: running casing and cementing, setting up safety equipment, testing or logging, or actual drilling operations.

### Abandonment Operations:

If the well is dry, the operator must receive plugging instruction from the staff engineers before plugging the well. Even though these instructions may be verbal, a "Notice of Intent to Abandon" and a "Subsequent Report of Abandonment" must be submitted on the Sundry Notice Form within 30 days of plugging the well. The Notice of Intent to Abandon may be approved immediately, but the Subsequent Report of Abandonment must be held until the well has been rehabilitated and a "Final Abandonment Notice" (FAN) has been received. At this point the site will be reinspected. Approval of the Subsequent Report of Abandonment releases the well from bond coverage and closes the District's files. BLM personnel usually inspect the physical plugging process.

### Subsequent Well Operations:

If the well is completed as a producer a permanent inspection file is set up, and if possible, the well is inspected at least once annually.

The operator is required to submit "Monthly Reports of Operations," "Well Completion or Recompletion Reports", and applications for any other sundry work which is not covered by the original APD or the Federal Regulations.

### Drainage Protection:

The District is responsible for protecting all Federal or Indian minerals from drainage. Drainage may be caused by state wells, fee or patented wells, other federal wells, or Indian wells. If a case of drainage is suspected, the lessee of the offended tract is notified and reservoir information is solicited. Once all needed information is obtained, a final decision is made and the lessee is again notified of the decision. This decision could involve a determination of "no drainage" or a demand to protect the lease from drainage. The lease could be protected by drilling another well or by paying compensatory royalty.

If the affected oil and gas reserves are unleased, the District recommends to MSO the offended tract be offered for leasing with appropriate drainage protection stipulations.



# APPENDIX M

## SPECIES LISTS

### Federally-listed Threatened and Endangered Wildlife Species and their Expected Occurrence in the Planning Area

Listed Endangered Species	Scientific Name	Expected Occurrence
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Migration, winter resident
Peregrine Falcon	<i>Falco peregrines</i>	Migration
Whooping Crane	<i>Grus americana</i>	Migration
Interior Least Tern	<i>Sterna antillarum athalossos</i>	Possible Breeding
Black-footed Ferret	<i>Mustela nigripes</i>	Possible resident of prairie dog towns
<b>Listed Threatened Species</b>		
Piping Plover	<i>Charadrius melodus</i>	Breeding

### Wildlife species with potential for listing as Threatened and Endangered by the State of North Dakota

Species	Scientific Name
<b>Endangered</b>	
Least Tern	<i>Sterna albifrons</i> <sup>1</sup>
White-winged Scoter	<i>Melanitta degiandii</i>
Common Merganser	<i>Mergus merganser</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i> <sup>1</sup>
Peregrine Falcon	<i>Falco peregrinus</i> <sup>1</sup>
Merlin	<i>Falco columbarius</i>
Sandhill Crane	<i>Grus canadensis</i>
Northern Swift Fox	<i>Vulpes velox hebes</i>
Black Bear	<i>Ursus americanus</i>
Fisher	<i>Martes pennanti</i>
Black-footed Ferret	<i>Mustela nigripes</i> <sup>1</sup>
River Otter	<i>Lutra canadensis</i>
<b>Threatened</b>	
Pallid Sturgeon	<i>Scaphirhynchus albus</i>
Greater Prairie Chicken	<i>Tympanuchus cupido</i>
Yellow Rail	<i>Coturnicops noveboracensis</i>
Piping Plover	<i>Charadrius melodus</i> <sup>2</sup>
Long-billed curlew	<i>Numenius americanus</i>
McCown's Longspur	<i>Calcarius mccownii</i>
Mountain Lion	<i>Felis concolor</i>

<sup>1</sup>Federally listed as endangered

<sup>2</sup>Federally listed as threatened

## Birds

Wild Turkey (*Meleagris gallopavo*)  
 Ring-necked Pheasant (*Phasianus colchicus*)  
 Sharp-tailed Grouse (*Tympanachus phasianellus*)  
 Sage Grouse (*Centrocercus urophasianus*)  
 Ruffed Grouse (*Bonasa umbellus*)  
 Golden Eagle (*Aquila chrysaetos*)  
 Giant Canada Goose (*Branta canadensis*)  
 Gray Partridge (*Perdix perdix*)  
 Bald Eagle (*Haliaeetus leucocephalus*)<sup>1, 2</sup>  
 Osprey (*Pandion haliaetus*)<sup>4</sup>  
 Peregrine Falcon (*Falco peregrinus*)<sup>1, 2</sup>  
 Merlin (*Falco columbarius*)<sup>2, 4</sup>  
 Whooping Crane (*Grus americana*)<sup>1</sup>  
 White-winged Scoter (*Melanitta fusca*)<sup>2</sup>  
 Greater Prairie-chicken (*Tympanuchus cupido*)<sup>3</sup>  
 Least Tern (*Sterna antillarum*)<sup>1, 2</sup>  
 McCown's Longspur (*Calcarius mccownii*)<sup>3, 4</sup>  
 Long-billed Curlew (*Numenius americanus*)<sup>3, 4</sup>  
 Common Loon (*Gavia immer*)  
 Common Goldeneye (*Bucephala clangula*)  
 Poor-will (*Phalaenoptilus nuttallii*)  
 Northern Pintail (*Anas acuta*)  
 Burrowing Owl (*Athene cunicularia*)<sup>4</sup>  
 Swainson's Hawk (*Buteo swainsoni*)<sup>5</sup>  
 Ferruginous Hawk (*Buteo regalis*)<sup>4, 5</sup>  
 Prairie Falcon (*Falco mexicanus*)<sup>4</sup>

White-tailed Deer (*Odocoileus virginianus*)  
 Mule Deer (*Odocoileus hemionus*)  
 Bighorn Sheep (*Ovis canadensis*)  
 Pronghorn (*Antilocarpa americana*)  
 Long-eared Myotis Bat (*Myotis evotis*)  
 Bobcat (*Lynx rufus*)  
 Snowshoe Hare (*Lepus americanus*)  
 Timber (Gray) Wolf (*Canis lupus*)  
 Black-footed Ferret (*Mustela nigripes*)<sup>1, 2</sup>  
 Northern Swift Fox (*Vulpes velox hebes*)<sup>2</sup>  
 Fisher (*Martes pennanti*)<sup>2</sup>  
 Moose (*Alces alces*)  
 Muskrat (*Ondatra zibethicus*)

Yellow-rumped (Audubon's) Warbler (*Dendroica coronata*)<sup>4</sup>  
 Chestnut-sided Warbler (*Dendroica pennsylvanica*)  
 Northern Waterthrush (*Seiurus noveboracensis*)  
 Mourning Warbler (*Oporornis philadelphia*)  
 Brewer's Sparrow (*Spizella breweri*)<sup>4</sup>  
 White-throated Sparrow (*Zonotrichia albicollis*)  
 Canvasback (*Aythya valisineria*)<sup>4</sup>  
 Redhead (*Aythya americana*)  
 Mallard (*Anas platyrhynchos*)  
 Blue-winged Teal (*Anas discors*)  
 Ruddy Duck (*Oxyura jamaicensis*)  
 Lesser Scaup (*Aythya affinis*)  
 Gadwall (*Anas strepera*)  
 American Wigeon (*Anas americana*)  
 Northern Shoveler (*Anas clypeata*)  
 Ring-necked Duck (*Aythya collaris*)  
 Green-winged Teal (*Anas crecca*)  
 Bufflehead (*Bucephala albeola*)  
 Hooded Merganser (*Lophodytes cucullatus*)  
 Common Merganser (*Mergus merganser*)<sup>2</sup>  
 Pileated Woodpecker (*Dryocopus pileatus*)  
 Mourning Dove (*Zenaida macroura*)  
 Eastern Screech Owl (*Otus asio*)  
 Cooper's Hawk (*Accipiter cooperii*)  
 Northern Harrier (*Circus cyaneus*)  
 Sandhill Crane (*Grus canadensis*)<sup>2, 4</sup>

## Mammals

Mink (*Mustela vison*)  
 Beaver (*Castor canadensis*)  
 Black Bear (*Ursus americanus*)<sup>2</sup>  
 River Otter (*Lutra canadensis*)<sup>2</sup>  
 Mountain Lion (*Felis concolor*)<sup>3</sup>  
 Elk (*Cervus elaphus*)  
 Canada Lynx (*Lynx canadensis*)  
 Hispid Pocket Mouse (*Perognathus hispidus*)  
 Plain's Pocket Mouse (*Perognathus flavescens*)  
 Ord's Kangaroo Rat (*Dipodomys ordii*)  
 Black-tailed Prairie Dog (*Cynomys ludovicianus*)  
 Red Fox (*Vulpes vulpes*)  
 Badger (*Taxidea taxus*)

<sup>1</sup>Federally listed Endangered.

<sup>2</sup>Potential for listing as endangered by State of North Dakota.

<sup>3</sup>Potential for listing as threatened by State of North Dakota.

<sup>4</sup>Migratory bird species of high federal interest.

<sup>5</sup>Under consideration for listing as threatened and endangered (Category 2).

# APPENDIX N

## LAND PATTERN ADJUSTMENT CRITERIA AND INITIAL CATEGORIZATION

This appendix presents general guidance for the land pattern adjustment program, specific criteria used to assess the manageability and resource values of individual tracts, and an initial categorization of tracts for retention or disposal under each alternative (Tables N-1 and N-2).

### General Program Guidance

The following criteria are based on objectives and criteria presented in the 1984 supplement to the Montana BLM State Director's Guidance — Land Pattern Review and Land Adjustment. These objectives and criteria are used, to varying extents, as general guidance under all alternatives.

#### Objectives of Land Pattern Adjustment

Land pattern adjustment decisions will be made after thorough analysis and study of land use potential and should achieve the following long-term objectives:

1. To retain those public lands having significant public values; acquire (by exchange) other lands which will contribute significantly to accomplishing public land management objectives.
2. To adjust the BLM land pattern to get the highest public value.
3. To identify and transfer those public lands which could attain a higher and better use in the private sector or if managed by another public agency.

#### Retention Criteria

Manageable lands containing the following values will be retained:

1. Wetlands and riparian areas determined to come under the definition of EO 11990.
2. Areas of national economic significance such as designated mineral resource areas where the disposal of the surface would interfere with the logical development of the mineral estate.
3. Areas where management is cost-effective or lands containing other important characteristics and public values which can best be managed in public ownership by BLM, including but not limited to:
  - a. strategic tracts along rivers, streams, lakes, ponds, springs, and trails;
  - b. important hunting or fishing areas;
  - c. recreation sites and areas;
4. Lands with a combination of broad multiple-use values.
5. Areas where future plans will lead to further consolidation and improvement of land patterns and reduce the costs of management.
6. Public lands withdrawn by the BLM for which the purpose of the withdrawal remains valid and the resource uses can be managed by BLM concurrently.

7. Public lands which provide public access and contain previously mentioned public values which, when considered together, warrant their retention.

#### Disposal Criteria

Disposal decisions will be made in the public interest based upon the following criteria:

1. Lands specifically identified through land use plans for sale, exchange, transfer or R & PP Act applications.
2. Lands of limited public value.
3. Widely scattered parcels which are difficult for BLM to manage with anything beyond minimal custodial administration.
4. Lands with high public values proper for management by other federal agencies, or state or local government.
5. Lands which will service important public objectives (such as community expansion) if outside of BLM administration.
6. Lands where disposal would aid in aggregating or repositioning other public lands or public land resource values in retention areas to facilitate national, state, and local objectives.
7. Lands with long-term unauthorized use problems, and which are not required for specific public purposes.
8. Lands where disposal would increase the range of economic opportunities provided to the general public.
9. Lands in which the highest value or most appropriate long-term use is agriculture, or commercial or industrial development.
10. Lands involved in BLM/USFS jurisdictional transfer and ongoing exchanges.

#### Selection Criteria

All acquisition proposals will be evaluated to determine if the selected lands would:

1. Facilitate access to areas retained for long-term public use.
2. Enhance congressionally designated areas, rivers, or trails.
3. Facilitate national, state and local BLM priorities or mission statement needs.
4. Facilitate implementation and/or be consistent with BLM land use and activity plans.
5. Stabilize or enhance local economies or values.
6. Meet long-term public land management goals.
7. Be of sufficient size to improve use of adjoining public lands or, if isolated, large enough to allow the identified potential public land use.
8. Allow more diverse use, more intensive use, or a change in uses to better fulfill the Bureau's mission.

**TABLE N-1**  
**INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE**

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
<i>COUNTY: Adams</i>								
129 N.	91 W.	5	NESE	40.00	D	D	D	R
TOTAL ACREAGE				40.00				
<i>COUNTY: Barnes</i>								
143 N.	60 W.	12	Lot 1	2.29	R	D	D <sup>4</sup>	R
			Lot 2	2.27	R	D	D <sup>4</sup>	R
TOTAL ACREAGE				4.56				
<i>COUNTY: Benson</i>								
151 N.	62 W.	34	SWNE	40.00	R	D	D <sup>4</sup>	R
			SWNW	40.00	R	D	D <sup>4</sup>	R
151 N.	65 W.	35	Lot 1	5.30	R	D	D <sup>4</sup>	R
151 N.	67 W.	13	Lot 2	4.14	R	D	D	R
TOTAL ACREAGE				89.44				
<i>COUNTY: Billings</i>								
141 N.	101 W.	10	All	640.00	D	D	D <sup>4</sup>	R
		18	SESE	40.00	D	D	D <sup>4</sup>	R
TOTAL ACREAGE				680.00				
<i>COUNTY: Bottineau</i>								
162 N.	74 W.	7	Lot 6	0.05	R	D	D <sup>4</sup>	R
TOTAL ACREAGE				0.05				
<i>COUNTY: Bowman</i>								
131 N.	103 W.	34	NENW	40.00	R	D	D	R
			NWSW	40.00	D	D	D	R
		35	SENE	40.00	D	D	D	R
129 N.	104 W.	31	Lot 1	39.82	R	D	D	R
			Lot 3	39.92	R	D	D	R
			Lot 4	39.98	R	D	D	R
		32	SWSW	40.00	D	D	D	R
130 N.	104 W.	18	Lot 4	37.53	R	D	D	R
129 N.	105 W.	1	W2SW	80.00	R	D	R	R
		2	Lot 1	40.05	R	D	R	R
			Lot 2	40.07	R	D	R	R
			Lot 3	40.09	R	D	R	R
			Lot 4	40.11	R	D	R	R
			S2NE	80.00	R	D	R	R
			E2SE	80.00	R	D	R	R
		5	SENW	40.00	D	D	D	R
			SWSW	40.00	D	D	D	R
			SESE	40.00	D	D	D	R
		6	Lot 4	39.47	D	D	D	R
			Lot 5	39.48	D	D	D	R
			Lot 7	39.54	D	D	D	R
		8	NWNE	40.00	D	D	D	R
			N2NW	80.00	D	D	D	R
			SENW	40.00	D	D	D	R
		11	N2NE	80.00	R	D	R	R
		12	N2NW	80.00	R	D	R	R
			SWNW	40.00	R	D	R	R
		14	NWNE	40.00	R	D	D	R
			E2NW	80.00	R	D	D	R
			SWNW	40.00	R	D	D	R
			NESW	40.00	R	D	D	R
		15	NENE	40.00	D	D	D	R
		23	SESE	40.00	D	D	D	R
		24	SWNE	40.00	R	D	D	R
			NWNW	40.00	D	D	D	R
			SWSE	40.00	R	D	D	R
		25	N2NW	80.00	D	D	D	R
		26	NENE	40.00	D	D	D	R
		29	NENW	40.00	D	D	D	R
		35	S2SE	80.00	D	D	D	R

TABLE N-1 (cont.)  
INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
<i>Bowman County (continued)</i>								
132 N.	105 W.	34	S2NW	80.00	D	D	R <sup>3</sup>	R
			SW	160.00	D	D	R <sup>3</sup>	R
132 N.	105 W.	34	W2SE	80.00	D	D	R <sup>3</sup>	R
129 N.	106 W.	3	SENW	40.00	D	D	R <sup>3</sup>	R
			NESW	40.00	D	D	R <sup>3</sup>	R
			S2SW	80.00	D	D	R <sup>3</sup>	R
		4	Lot 5	21.58	D	D	R <sup>3</sup>	R
			Lot 6	29.70	R	D	R <sup>3</sup>	R
			Lot 7	31.00	R	D	R <sup>3</sup>	R
		5	Lot 4	40.40	R	R	R	R
			Lot 5	33.60	R	R	R	R
			Lot 10	19.00	R	R	R	R
			W2SW	80.00	R	R	R	R
			SESW	40.00	R	R	R	R
		6	All	634.40	R	R	R	R
		7	Lot 1	38.75	R	R	R	R
			Lot 2	38.81	R	R	R	R
			Lot 3	38.87	R	R	R	R
			W2NE	80.00	R	R	R	R
			E2NW	80.00	R	R	R	R
			E2SW	80.00	R	R	R	R
			SE	160.00	R	R	R	R
		11	N2NE	80.00	D	D	D	R
			SENE	40.00	D	D	D	R
		12	NWNW	40.00	D	D	D	R
		15	Lot 1	34.50	D	D	R <sup>3</sup>	R
			Lot 2	14.80	R	D	R <sup>3</sup>	R
			NENE	40.00	R	D	R <sup>3</sup>	R
			E2SE	80.00	D	D	R <sup>3</sup>	R
		18	Lot 2	39.05	R	R	R <sup>3</sup>	R
			Lot 3	39.11	D	D	R <sup>3</sup>	R
			NENE	40.00	D	D	R	R
			NESW	40.00	D	D	R <sup>3</sup>	R
		19	Lot 4	39.41	D	D	R <sup>3</sup>	R
		20	S2NW	80.00	D	D	R <sup>3</sup>	R
		21	Lot 7	14.56	D	D	R <sup>3</sup>	R
			NWSW	40.00	R	D	R <sup>3</sup>	R
		22	E2NE	80.00	D	D	R <sup>3</sup>	R
		23	SENE	40.00	D	D	D	R
		24	SESW	40.00	D	D	D	R
		27	Lot 3	27.60	R	D	R <sup>3</sup>	R
			Lot 4	36.30	R	D	R <sup>3</sup>	R
		28	Lot 13	19.50	R	D	R <sup>3</sup>	R
			Lot 15	12.40	R	D	R <sup>3</sup>	R
		30	Lot 1	39.47	D	D	R <sup>3</sup>	R
		33	Lot 3	38.10	R	D	R <sup>3</sup>	R
			W2NW	80.00	R	D	R <sup>3</sup>	R
			W2SW	80.00	R	D	R <sup>3</sup>	R
130 N.	106 W.	1	SESE	40.00	R	D	R <sup>3</sup>	R
		2	Lot 11	29.90	R	D	R <sup>3</sup>	R
		4	Lot 4	40.00	R	R	R	R
			S2NW	80.00	R	R	R	R
			SW	160.00	R	R	R	R
			W2SE	80.00	R	R	R	R
			SESE	40.00	R	R	R	R
		5	NW	160.06	R	R	R	R
		6	All	626.39	R	R	R	R
		7	All	627.76	R	R	R	R
		8	S2	320.00	R	R	R	R
		9	N2NE	80.00	R	R	R	R
			SWNE	40.00	R	R	R	R
			W2	320.00	R	R	R	R
			W2SE	80.00	R	R	R	R
			SESE	40.00	R	R	R	R
		17	All	640.00	R	R	R	R
		18	All	629.20	R	R	R	R

TABLE N-1 (cont.)  
INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
Bowman County (continued)								
130 N.	107 W.	24	All	640.00	R	R	R	R
		25	All	640.00	R	R	R	R
		26	N2	320.00	R	R	R	R
			NESW	40.00	R	R	R	R
			SE	160.00	R	R	R	R
		27	N2	191.15	R	R	R	R
		35	NENE	40.00	R	R	R	R
131 N.	107 W.	2	NW	159.90	D	D	R <sup>3</sup>	R
		10	All	363.54	R	R	R	R
		14	W2	320.00	R	R	R	R
		15	All	364.32	R	R	R	R
		22	All	367.00	R	R	R	R
		23	All	640.00	R	R	R	R
		24	SW	160.00	R	R	R	R
		25	W2	320.00	R	R	R	R
		26	All	640.00	R	R	R	R
		27	All	369.40	R	R	R	R
		34	All	372.00	R	R	R	R
		35	All	640.00	R	R	R	R
132 N.	107 W.	26	NENE	40.00	D	D	D	R
			SW	160.00	D	D	D	R
			S2SE	80.00	D	D	D	R
TOTAL ACREAGE				32,568.38				
COUNTY: Burleigh								
142 N.	75 W.	12	S2SW	80.00	R	D	D	R
		14	S2SW	80.00	R	D	D	R
			E2SE	80.00	R	D	D	R
		22	N2NE	80.00	R	D	D	R
		26	NWNE	40.00	R	D	D	R
			NENW	40.00	R	D	D	R
144 N.	77 W.	22	NE	160.00	R	D	D	R
137 N.	79 W.	19	Tract 39	26.76	R	D	D <sup>2</sup>	R
		33	Lot 1	9.30	R	D	D <sup>2</sup>	R
137 N.	80 W.	14	Lot 2	35.50	R	D	D <sup>2</sup>	R
139 N.	81 W.	4	Lot 1	3.70	R	D	D <sup>2</sup>	R
141 N.	81 W.	24	Lot 4	46.50	R	D	D <sup>2</sup>	R
		26	Lot 1	28.20	R	D	D <sup>2</sup>	R
			Lot 2	53.40	R	D	D <sup>2</sup>	R
			NESE	40.00	R	D	D <sup>2</sup>	R
			SWSE	40.00	R	D	D <sup>2</sup>	R
		142 N.	81 W.	4	Lot 4	19.60	R	D
TOTAL ACREAGE				862.96				
COUNTY: Cavalier								
162 N.	58 W.	9	NWNE	40.00	R	D	D	R
163 N.	58 W.	6	Lot 2	39.64	R	D	D	R
			Lot 3	39.80	R	D	D	R
			SWNE	40.00	R	D	D	R
		25	SENE	40.00	R	D	D	R
			SENE	40.00	R	D	D	R
164 N.	59 W.	35	NENE	40.00	R	D	D	R
TOTAL ACREAGE				239.44				
COUNTY: Divide								
163 N.	95 W.	25	SWSW	40.00	R	D	D <sup>4</sup>	R
		26	SESE	40.00	R	D	D <sup>4</sup>	R
		27	SWSE	40.00	R	D	D	R
160 N.	99 W.	5	SWSE	40.00	R	D	D <sup>4</sup>	R
160 N.	100 W.	22	SWNE	40.00	R	D	D <sup>4</sup>	R
			NWSE	40.00	R	D	D <sup>4</sup>	R
162 N.	102 W.	8	SWNW	40.00	R	D	D	R
			N2SW	80.00	R	D	D	R

TABLE N-1 (cont.)  
INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
<i>Dunn County (continued)</i>								
148 N.	95 W.	29	NE	160.00	R	R	R	R
			E2NW	80.00	R	R	R	R
			NESW	40.00	R	R	R	R
			N2SE	80.00	R	R	R	R
		30	Lot 1	43.97	R	D	R <sup>3</sup>	R
			Lot 2	43.91	R	D	R <sup>3</sup>	R
			Lot 3	43.85	R	D	R <sup>3</sup>	R
			W2NE	80.00	R	D	R <sup>3</sup>	R
			E2NW	80.00	R	D	R <sup>3</sup>	R
			NESW	40.00	R	D	R <sup>3</sup>	R
			NWSE	40.00	R	D	R <sup>3</sup>	R
147 N.	96 W.	2	S2NE	80.00	R	D	R <sup>3</sup>	R
		4	E2E2	161.13	R	D	R <sup>3</sup>	R
			SW	160.00	R	D	R <sup>3</sup>	R
		6	Lot 3	40.29	R	D	R <sup>3</sup>	R
			NE	161.19	R	D	R <sup>3</sup>	R
		12	E2NW	80.00	R	D	D	R
			N2SE	80.00	R	D	D	R
148 N.	96 W.	1	SENW	40.00	R	D	R <sup>3</sup>	R
		2	SWNE	40.00	R	D	R <sup>3</sup>	R
			S2NW	80.00	R	D	R <sup>3</sup>	R
			NESW	40.00	R	D	R <sup>3</sup>	R
			NWSE	40.00	R	D	R <sup>3</sup>	R
		3	Lot 1	25.62	R	D	R <sup>3</sup>	R
			Lot 2	25.84	R	D	R <sup>3</sup>	R
		5	NE	134.64	R	D	R <sup>3</sup>	R
			NWSE	40.00	R	D	R <sup>3</sup>	R
		6	Lot 2	27.24	R	D	R <sup>3</sup>	R
			Lot 6	33.16	R	R	R	R
			Lot 7	9.50	R	R	R	R
			Lot 8	12.87	R	R	R	R
			SWNE	40.00	R	D	R <sup>3</sup>	R
			NW	135.04	R	R	R	R
			NESW	40.00	R	R	R	R
		7	Lot 3	38.14	R	R	R	R
			Lot 4	0.80	R	R	R	R
			Lot 11	38.05	R	D	R <sup>3</sup>	R
			SESW	40.00	R	D	R <sup>3</sup>	R
		8	SENW	40.00	R	D	R <sup>3</sup>	R
			NESW	40.00	R	D	R <sup>3</sup>	R
			N2SE	80.00	R	D	R <sup>3</sup>	R
		9	SWNW	40.00	R	D	R <sup>3</sup>	R
		17	Lot 1	39.70	R	D	R <sup>3</sup>	R
			Lot 2	27.20	R	D	R <sup>3</sup>	R
			Lot 3	38.60	R	D	R <sup>3</sup>	R
			Lot 4	44.70	R	D	R <sup>3</sup>	R
			E2NE	80.00	R	D	R <sup>3</sup>	R
			NWNE	40.00	R	D	R <sup>3</sup>	R
		18	E2NW	80.00	R	D	R <sup>3</sup>	R
		19	SENW	40.00	R	D	R <sup>3</sup>	R
		21	Lot 5	34.60	R	D	R <sup>3</sup>	R
			S2	320.00	R	D	R <sup>3</sup>	R
		22	N2SW	80.00	R	D	R <sup>3</sup>	R
			SWSW	40.00	R	D	R <sup>3</sup>	R
		23	SWNE	40.00	R	D	R <sup>3</sup>	R
			N2SE	80.00	R	D	R <sup>3</sup>	R
		24	E2NE	80.00	R	D	R <sup>3</sup>	R
		25	S2NE	80.00	R	D	R <sup>3</sup>	R
		26	Lot 7	25.50	R	D	R <sup>3</sup>	R
			Lot 9	47.50	R	D	R <sup>3</sup>	R
		28	N2NW	80.00	R	D	R <sup>3</sup>	R
			NESE	40.00	R	D	R <sup>3</sup>	R
		29	NENE	40.00	R	D	R <sup>3</sup>	R
			W2SW	80.00	R	R	R	R
			SESE	40.00	R	D	R <sup>3</sup>	R
		30	W2	300.80	R	R	R	R



**TABLE N-1 (cont.)**  
**INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE**

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
<i>Dunn County (continued)</i>								
148 N.	97 W.	10	NESE	40.00	R	R	R	R
		11	NWNW	40.00	R	R	R	R
			E2SE	80.00	R	R	R	R
		12	Lot 1	21.50	R	R	R	R
			Lot 2	8.05	R	R	R	R
			SW	160.00	R	R	R	R
			W2SE	80.00	R	R	R	R
		13	W2NE	80.00	R	R	R	R
			SENE	40.00	R	R	R	R
			NW	160.00	R	R	R	R
			S2	320.00	R	R	R	R
		14	E2	320.00	R	R	R	R
		15	Lot 4	22.50	R	D	R <sup>3</sup>	R
			Lot 5	24.80	R	D	R <sup>3</sup>	R
			Lot 10	35.50	R	D	R <sup>3</sup>	R
			Lot 11	11.25	R	D	R <sup>3</sup>	R
			Lot 12	10.00	R	D	R <sup>3</sup>	R
		19	Lot 4	37.15	R	D	R <sup>3</sup>	R
			SESW	40.00	R	D	R <sup>3</sup>	R
			SWSE	40.00	R	D	R <sup>3</sup>	R
		21	Lot 2	9.60	R	D	R <sup>3</sup>	R
		22	Lot 2	23.60	R	D	R <sup>3</sup>	R
		23	E2SW	80.00	R	R	R	R
			SE	160.00	R	R	R	R
		24	All	640.00	R	R	R	R
		25	W2	320.00	R	R	R	R
		26	N2NE	80.00	R	R	R	R
			SENE	40.00	R	R	R	R
			NENW	40.00	R	R	R	R
			S2SW	80.00	R	D	R <sup>3</sup>	R
			E2SE	80.00	R	R	R	R
		27	E2	320.00	R	D	R <sup>3</sup>	R
		28	Lot 1	26.80	R	D	R <sup>3</sup>	R
			Lot 8	24.50	R	D	R <sup>3</sup>	R
			SWNW	40.00	R	D	R <sup>3</sup>	R
		29	S2NE	80.00	R	D	R <sup>3</sup>	R
			E2SW	80.00	R	D	R <sup>3</sup>	R
			N2SE	80.00	R	D	R <sup>3</sup>	R
			SWSE	40.00	R	D	R <sup>3</sup>	R
		30	Lot 2	37.27	R	D	R <sup>3</sup>	R
			Lot 3	37.33	R	D	R <sup>3</sup>	R
			Lot 4	37.41	R	D	R <sup>3</sup>	R
			SESW	40.00	R	D	R <sup>3</sup>	R
			SWSE	40.00	R	D	R <sup>3</sup>	R
		31	Lot 6	48.25	R	D	R <sup>3</sup>	R
			N2NE	80.00	R	D	R <sup>3</sup>	R
			SWNE	40.00	R	D	R <sup>3</sup>	R
			W2	326.68	R	D	R <sup>3</sup>	R
			NWSE	40.00	R	D	R <sup>3</sup>	R
		32	W2NE	80.00	R	D	R <sup>3</sup>	R
			N2NW	80.00	R	D	R <sup>3</sup>	R
		33	Lot 3	17.50	R	D	R <sup>3</sup>	R
			Lot 6	29.80	R	D	R <sup>3</sup>	R
			Lot 8	16.10	R	D	R <sup>3</sup>	R
TOTAL ACREAGE				15,989.22				
<i>COUNTY: Eddy</i>								
149 N.	63 W.	27	Lot 1	10.82	R	D	D	R
150 N.	63 W.	14	Lot 1	2.78	R	D	D <sup>4</sup>	R
		19	Lot 1	0.25	R	D	D	R
		26	NESW	40.00	R	D	D <sup>4</sup>	R
TOTAL ACREAGE				53.85				
<i>COUNTY: Emmons</i>								
135 N.	74 W.	6	Lot 1	46.13	R	D	D <sup>4</sup>	R
136 N.	74 W.	32	S2NE	80.00	R	D	D <sup>4</sup>	R
			S2NW	80.00	R	D	D <sup>4</sup>	R

TABLE N-1 (cont.)  
INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
<i>Grant County (continued)</i>								
131 N.	86 W.	22	E2SW	80.00	D	D	D	R
			SE	160.00	D	D	D	R
134 N.	86 W.	4	S2SW	80.00	D	D	D	R
135 N.	86 W.	34	NWNW	40.00	D	D	D	R
129 N.	87 W.	8	Lot 1	1.20	D	D	D	R
		9	Lot 2	0.08	D	D	D	R
132 N.	87 W.	32	N2NW	80.00	D	D	D	R
132 N.	88 W.	24	SENE	40.00	D	D	D	R
134 N.	88 W.	30	Lot 1	0.61	D	D	D	R
130 N.	89 W.	34	NWNE	40.00	D	D	D	R
130 N.	90 W.	27	Lot 4	0.50	D	D	D	R
		28	Lot 3	1.50	D	D	D <sup>2</sup>	R
TOTAL ACREAGE				583.75				
<i>COUNTY: Kidder</i>								
139 N.	70 W.	10	Lot 4	7.54	R	D	D	R
144 N.	70 W.	28	SWSW	40.00	R	D	D	R
137 N.	71 W.	24	Lot 5	8.58	R	D	D <sup>4</sup>	R
140 N.	71 W.	6	SENE	40.00	R	D	D <sup>4</sup>	R
			SE	160.00	R	D	D <sup>4</sup>	R
144 N.	71 W.	28	Lot 3	15.50	R	D	D <sup>4</sup>	R
138 N.	72 W.	4	NE	158.89	R	D	D <sup>4</sup>	R
			S2NW	80.00	R	D	D <sup>4</sup>	R
			SW	160.00	R	D	D <sup>4</sup>	R
		8	NENE	40.00	R	D	D <sup>4</sup>	R
		18	NW	156.32	R	D	D <sup>4</sup>	R
140 N.	72 W.	14	Lot 1	32.00	R	D	D <sup>4</sup>	R
			Lot 2	36.80	R	D	D <sup>4</sup>	R
		22	SENE	40.00	R	D	D <sup>4</sup>	R
			SE	160.00	R	D	D <sup>4</sup>	R
141 N.	72 W.	22	Lot 1	25.20	R	D	D <sup>4</sup>	R
142 N.	72 W.	34	NESE	40.00	R	D	D <sup>4</sup>	R
143 N.	72 W.	4	Lot 5	0.22	R	D	D <sup>4</sup>	R
		6	Lot 3	22.00	R	D	D <sup>4</sup>	R
		28	Lot 3	2.48	R	D	D <sup>4</sup>	R
138 N.	73 W.	12	NWNE	40.00	R	D	D <sup>4</sup>	R
			SESE	40.00	R	D	D <sup>4</sup>	R
		14	S2N2	160.00	R	D	D <sup>4</sup>	R
143 N.	74 W.	4	Lot 1	27.40	R	D	D <sup>4</sup>	R
			Lot 2	26.40	R	D	D <sup>4</sup>	R
144 N.	74 W.	12	Lot 4	0.67	R	D	D <sup>4</sup>	R
TOTAL ACREAGE				1520.00				
<i>COUNTY: Logan</i>								
136 N.	68 W.	30	NWNE	40.00	R	D	D <sup>1</sup>	R
134 N.	69 W.	14	NWNW	40.00	R	D	D <sup>4</sup>	R
			W2SW	80.00	R	D	D <sup>4</sup>	R
		34	NWNE	40.00	R	D	D <sup>4</sup>	R
			NENW	40.00	R	D	D <sup>4</sup>	R
135 N.	69 W.	28	N2NE	80.00	R	D	D <sup>4</sup>	R
		32	NE	160.00	R	D	D <sup>4</sup>	R
136 N.	69 W.	8	SWNE	40.00	R	D	D <sup>4</sup>	R
135 N.	70 W.	8	NESWSWSW	2.50	R	D	D	R
TOTAL ACREAGE				522.50				

TABLE N-1 (cont.)  
INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
<i>COUNTY: McIntosh</i>								
129 N.	68 W.	12	NWNW	40.00	R	D	D <sup>1</sup>	R
130 N.	68 W.	24	Lot 6	39.80	R	D	D <sup>1</sup>	R
			SWNE	40.00	R	D	D <sup>1</sup>	R
			NWSE	40.00	R	D	D <sup>1</sup>	R
132 N.	68 W.	20	NENE	40.00	R	D	D <sup>1</sup>	R
132 N.	72 W.	6	Lot 1	12.84	R	D	D <sup>1</sup>	R
TOTAL ACREAGE				212.64				
<i>COUNTY: McKenzie</i>								
152 N.	93 W.	8	Lot 4	14.95	D	D	D	R
153 N.	94 W.	3	Lot 3	2.22	R	D	D <sup>1</sup>	R
153 N.	93 W.	28	Lot 5	38.30	R	D	D <sup>1</sup>	R
			Lot 6	31.40	R	D	D <sup>1</sup>	R
			Lot 7	25.70	R	D	D <sup>1</sup>	R
			Lot 8	16.50	R	D	D <sup>1</sup>	R
			S2SW	80.00	R	D	D <sup>1</sup>	R
149 N.	95 W.	1	Lot 1	48.10	D	D	D	R
		10	SESE	40.00	D	D	D	R
150 N.	95 W.	24	Lot 4	46.99	D	D	D	R
		25	Lot 1	47.11	D	D	D	R
152 N.	98 W.	5	Lot 10	40.00	R	D	D	R
			Lot 11	40.00	R	D	D	R
			Lot 12	40.00	R	D	D	R
153 N.	98 W.	24	SWSE	40.00	D	D	D	R
		25	W2NE	80.00	D	D	D	R
147 N.	99 W.	22	NWNW	40.00	D	D	D	R
149 N.	99 W.	35	NENE	40.00	D	D	D	R
151 N.	99 W.	6	Lot 5	38.25	D	D	D	R
152 N.	99 W.	7	Lot 3	37.60	D	D	D	R
		24	NWNE	40.00	D	D	D	R
152 N.	100 W.	24	SENW	40.00	D	D	D	R
			SWSW	40.00	D	D	D	R
			SESE	40.00	D	D	D	R
		25	W2NW	80.00	D	D	D	R
152 N.	100 W.	26	NENW	40.00	D	D	D	R
153 N.	100 W.	6	Lot 9	20.70	R	D	D <sup>1</sup>	R
		18	Lot 3	39.85	D	D	D	R
			NESW	40.00	D	D	D	R
152 N.	101 W.	12	NWSE	40.00	D	D	D	R
		14	SWSW	40.00	D	D	D	R
			SESE	40.00	D	D	D	R
		22	SENW	40.00	D	D	D	R
153 N.	101 W.	10	SESE	40.00	D	D	D	R
149 N.	102 W.	17	NESE	40.00	D	D	D	R
152 N.	102 W.	21	Lot 5	1.01	D	D	D	R
152 N.	103 W.	13	Lot 6	25.00	D	D	D <sup>2</sup>	R
			Lot 7	31.10	D	D	D <sup>2</sup>	R
		14	Lot 5	3.75	D	D	D <sup>2</sup>	R
		24	SESW	40.00	D	D	D	R
151 N.	104 W.	26	Lot 1	9.00	D	D	D	R
			Lot 4	31.70	D	D	D	R
		35	SWNE	10.00	D	D	D	R
			(portion north of RR)					
152 N.	104 W.	21	Lot 7	17.50	D	D	D <sup>2</sup>	R
		22	Lot 3	6.60	D	D	D <sup>2</sup>	R
			Lot 4	10.00	D	D	D <sup>2</sup>	R
		27	Lot 3	1.63	D	D	D <sup>2</sup>	R
		30	Lot 1	34.13	D	D	D	R
TOTAL ACREAGE				1629.09				

TABLE N-1 (cont.)  
INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
COUNTY: Mountrail								
155 N.	88 W.	20	Lot 4	6.87	R	D	D <sup>1</sup>	R
156 N.	88 W.	17	SWNE	40.00	R	D	D <sup>1</sup>	R
156 N.	89 W.	3	SENW	40.00	R	D	D	R
		7	Lot 1	7.10	R	D	D <sup>1</sup>	R
			Lot 2	8.70	R	D	D <sup>1</sup>	R
		27	NWNE	40.00	R	D	D	R
		157 N.	89 W.	29	Lot 1	16.80	R	D
		32	Lot 1	1.10	R	D	D <sup>1</sup>	R
152 N.	90 W.	5	SWSE	40.00	R	D	D	R
153 N.	90 W.	20	NENE	40.00	R	D	D	R
156 N.	90 W.	20	SESW	40.00	R	D	D <sup>1</sup>	R
			SWSE	40.00	R	D	D <sup>1</sup>	R
158 N.	90 W.	18	SENE	40.00	R	D	D <sup>1</sup>	R
154 N.	91 W.	4	Lot 4	40.05	R	D	D	R
			SWNE	40.00	R	D	D	R
			NWSW	40.00	R	D	D	R
156 N.	91 W.	5	Lot 4	60.55	R	D	D <sup>1</sup>	R
		13	W2NE	80.00	R	D	D <sup>1</sup>	R
		34	Lot 2	17.30	R	D	D <sup>1</sup>	R
154 N.	92 W.	31	Lot 1	38.85	R	D	D	R
153 N.	93 W.	13	SESW	40.00	R	D	D	R
		26	SENE	40.00	R	D	D	R
			NESE	40.00	R	D	D	R
154 N	94 W.	10	NESW	40.00	R	D	D	R
		20	NWNW	40.00	R	D	D	R
		25	NWSW	40.00	R	D	D	R
155 N.	94 W.	15	SWNE	40.00	R	D	D	R
		35	SWNW	40.00	R	D	D	R
TOTAL ACREAGE				997.32				
COUNTY: Oliver								
141 N.	81 W.	2	Lot 4	14.50	R	D	D <sup>1</sup>	R
		12	Lot 7	23.50	R	D	D <sup>2</sup>	R
144 N.	83 W.	32	Lot 5	4.26	R	D	D <sup>2</sup>	R
			Lot 6	8.87	R	D	D <sup>2</sup>	R
			Lot 7	20.94	R	D	D <sup>2</sup>	R
			Lot 8	40.38	R	D	D <sup>2</sup>	R
TOTAL ACREAGE				112.45				
COUNTY: Pierce								
157 N.	72 W.	18	NWNE	40.00	R	D	D	R
		23	Lot 5	0.32	R	D	D <sup>1</sup>	R
152 N.	73 W.	5	Lot 10	0.15	R	D	D <sup>1</sup>	R
		21	NWNW	40.00	R	D	D	R
152 N.	74 W.	8	Lot 1	4.57	R	D	D <sup>1</sup>	R
			Lot 5	24.50	R	D	D <sup>1</sup>	R
			Lot 6	16.80	R	D	D <sup>1</sup>	R
154 N.	74 W.	30	NESW	40.00	R	D	R <sup>1</sup>	R
TOTAL ACREAGE				166.34				
COUNTY: Renville								
158 N.	86 W.	30	Lot 2	38.31	R	D	D	R
		33	SWNW	40.00	R	D	D	R
TOTAL ACREAGE				78.31				
COUNTY: Sheridan								
145 N.	74 W.	26	SENW	40.00	R	D	D <sup>1</sup>	R
			NESE	40.00	R	D	D <sup>1</sup>	R
150 N.	75 W.	14	S2NW	80.00	R	D	D <sup>1</sup>	R
149 N.	77 W.	2	Lot 7	13.40	R	D	D <sup>1</sup>	R

**TABLE N-1 (cont.)**  
**INITIAL CATEGORIZATION OF PUBLIC LANDS, BY ALTERNATIVE**

T.	R.	Sec.	Subdivision	Acreage	Altern. A No Action	Altern. B	Altern. C	Altern. D
Williams County (continued)								
152 N.	104 W.	14	Lot 1	40.30	D	D	D <sup>2</sup>	R
			Lot 2	27.00	D	D	D <sup>2</sup>	R
			Lot 3	20.90	D	D	D <sup>2</sup>	R
		15	Lot 1	14.75	D	D	D <sup>2</sup>	R
			Lot 2	16.10	D	D	D <sup>2</sup>	R
153 N.	104 W.	10	Lot 1	29.91	D	D	D	R
		20	Lot 4	8.10	D	D	D <sup>2</sup>	R
		21	Lot 4	11.00	D	D	D <sup>2</sup>	R
		23	Lot 1	3.31	D	D	D <sup>2</sup>	R
		24	Lot 2	11.80	D	D	D <sup>2</sup>	R
			Lot 3	34.25	D	D	D <sup>2</sup>	R
TOTAL ACREAGE				1321.30				

<sup>1</sup>Identified as suitable for mitigating impacts of Garrison Diversion projects.

<sup>2</sup>Need a cadastral survey determination of acreage and land status.

<sup>3</sup>Located within Big Gumbo or Lost Bridge consolidation areas. Available for exchange for other lands within either consolidation area.

<sup>4</sup>These areas contain or are adjacent to wetlands. Disposal would be contingent on protection of important wetlands values.